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Stability and Control Characteristics of a Monoplanar Missile Configuration With Triform-Tail-Fin Arrangements at Mach Numbers From 1.70 to 2.86

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Stability and Control Characteristics of a Monoplanar Missile Configuration With Triform-Tail-Fin Arrangements at Mach Numbers From 1.70 to 2.86

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SUMMARY

An experimental wind-tunnel investigation has been made to determine the longitudinal and lateral-directional aerodynamic stability and control characteristics of six triform-tail-fin arrangements on a monoplanar missile model. The triform-tail arrangements consisted of either a lower vertical tail fin with a pair of horizontal fins having 0°, 22.5°, or 30° dihedral or an upper vertical tail fin with horizontal fins having 0°, -22.5°, or -30° dihedral. Various combinations of tail-fin deflections provided pitch, yaw, and roll control.

The results indicated that those configurations with horizontal fins at or below the horizontal plane had nearly linear pitching-moment characteristics, while those with the horizontal fins above the horizontal plane experienced pitch-up which increased with increasing horizontal-fin-dihedral angle. No noticeable difference in lift-curve slope or pitch-control effectiveness occurred for the horizontal-fin-dihedral angles that were tested. At zero angle of attack, the configurations were directionally stable at most test Mach numbers, and the level of stability was affected by the absolute value of the horizontal-fin-dihedral angle. Generally, those configurations with the upper vertical fin had positive effective dihedral at zero angle of attack, while those with the lower vertical fin had negative effective dihedral. For both the upper and the lower vertical fin configurations, reducing the magnitude of the horizontal-fin-dihedral angle increased the magnitude of the lateral stability parameter. All the configurations with the horizontal fins deflected for roll control had essentially the same roll-control effectiveness at zero angle of attack. The yaw-control effectiveness of the vertical fins was essentially unchanged by the dihedral angle of the horizontal fins. For roll control, three deflected tail fins produced more total roll control than the two horizontal fins. The two horizontal fins were more effective per degree of total tail-fin deflection below a Mach number of approximately 2.0, but less effective above a Mach number of approximately 2.0. For yaw control, three tail fins deflected equally or differentially produced more total yaw control than the single vertical fin. The three fins deflected equally produced the most total yaw control. However, the effectiveness per degree of total fin deflection was greatest for the single vertical fin deflected and least for the three fins deflected equally.

INTRODUCTION

The National Aeronautics and Space Administration is currently conducting aerodynamic studies of various monoplanar missile configurations in order to provide insight into the potential for improving conformal carriage, performance, and maneuverability for future air-launched missiles. Some promising configurations, from the conformal-carriage standpoint, utilizing low-profile tails are reported in references 1, 2, and 3.

The experimental investigation presented herein was conducted to evaluate triform-tail conformal-carriage configurations for possible aerodynamic improvements. The configurations consisted of a circular body with monoplanar wings and with six different triform-tail fin arrangements. The tail-fin arrangements consisted of either a lower vertical tail fin with a pair of horizontal fins having 0°, 22.5°, or

30° dihedral or an upper vertical tail fin with a pair of horizontal fins having 0°, -22.5°, or -30° dihedral. The tests were conducted in the Langley Unitary Plan Wind Tunnel at supersonic Mach numbers from 1.70 to 2.86. The nominal angle-of-attack range was -4° to 26° and the nominal angle-of-sideslip range was -4° to 6°. The test Reynolds number was 6.6×10^6 per meter. The results included the effects of the various tail-fin arrangements on the longitudinal and lateral-directional aerodynamic stability and control characteristics. Various combinations of tail-fin deflections were utilized to provide pitch, yaw, and roll control.

SYMBOLS

The aerodynamic data are referred to the body-axis system except for lift and drag, which are referred to the stability-axis system. The moment reference is located 51.51 cm aft of the model nose or at 60.0 percent of the body length.

b wing span, 24.49 cm

C_A axial-force coefficient, $\frac{\text{Axial force}}{qS}$

C_D drag coefficient, $\frac{\text{Drag}}{qS}$

$C_{D,o}$ drag coefficient at $\alpha = 0°$, $\frac{\text{Drag}}{qS}$

C_L lift coefficient, $\frac{\text{Lift}}{qS}$

C_{L_α} lift-curve slope near $\alpha = 0°$, per degree

C_l rolling-moment coefficient, $\frac{\text{Rolling moment}}{qSb}$

C_{l_β} effective-dihedral parameter, $\left(\frac{\Delta C_l}{\Delta \beta}\right)_{\beta=0°,3°}$ (positive effective dihedral is defined as a negative value of C_{l_β})

C_{l_δ} roll-control effectiveness per degree of total tail-fin deflection $(\delta_{r,V} + 2\delta_{r,H})$

C_m pitching-moment coefficient, $\frac{\text{Pitching moment}}{qSl}$

C_{m_δ} pitch-control effectiveness of horizontal tail fins at $\alpha = 0°$, per degree of deflection, $\left(\frac{\Delta C_m}{\Delta \delta_p}\right)_{\delta_p=0°,-10°}$

C_N normal-force coefficient, $\frac{\text{Normal force}}{qS}$

C_n yawing-moment coefficient, $\frac{\text{Yawing moment}}{qSb}$

C_{n_δ} yaw-control effectiveness per degree of total tail-fin deflection $(\delta_{n,V} + 2\delta_{n,H})$

C_{n_β} directional-stability parameter, $\left(\frac{\Delta C_n}{\Delta \beta}\right)_{\beta=0°,3°}$

C_Y side-force coefficient, $\frac{\text{Side force}}{qS}$

C_{Y_β} side-force parameter, $\left(\frac{\Delta C_Y}{\Delta \beta}\right)_{\beta=0°,3°}$

L/D lift-drag ratio

l reference body length, 85.85 cm

M free-stream Mach number

q free-stream dynamic pressure, Pa

S reference area, wing area including body centerline intercepts, 0.0649 m^2

α angle of attack, deg

β angle of sideslip, deg

δ_p individual deflection angle of the horizontal fins to provide pitch control (negative with leading edge down), deg

δ_n individual fin deflection angle to provide yaw control (negative with leading edge left as viewed from rear), deg

δ_r individual fin deflection angle to provide roll control (positive to provide a clockwise rotation as viewed from rear), deg

ϕ_H horizontal-fin-dihedral angle, measured angle between the horizontal plane and the horizontal tail fin (positive for fin tip above the horizontal plane), deg (see fig. 1)

Subscripts:

H tail fins located in planes other than the vertical plane

V tail fin located in the vertical plane

APPARATUS AND TESTS

Wind Tunnel

The investigation was conducted in the low Mach number test section of the Langley Unitary Plan Wind Tunnel, which is a variable-pressure continuous-flow

facility (ref. 4). The test section is approximately 2.13 m long and 1.22 m square. The nozzle leading to the test section is of the asymmetric sliding-block type, which permits a continuous variation in supersonic Mach number from about 1.5 to 2.9.

Model

Dimensional details of the model are shown in figure 1. The configurations tested herein were similar to those of references 2 and 3 and used many of the same parts. They were changed from the low-profile four-fin configuration of references 2 and 3 to the three-fin arrangement of the present report. The cylindrical body had a fineness ratio of 13 with a 3.0 caliber tangent ogive nose. The model had monoplanar delta-planform slab wings with beveled leading and trailing edges. The three tail fins had slab cross sections with beveled leading and trailing edges and were arranged in the following six ways:

1. Two horizontal fins and a lower vertical fin

2. Two horizontal fins and an upper vertical fin

3. Two fins of 22.5° dihedral and a lower vertical fin

4. Two fins of -22.5° dihedral and an upper vertical fin

5. Two fins of 30.0° dihedral and a lower vertical fin

6. Two fins of -30.0° dihedral and an upper vertical fin

Henceforth, these configurations are called models 1 through 6 (see fig. 1). The fins that were not in the vertical plane are referred to as horizontal fins. The fins could be deflected in 5° increments over a range of ±30° to provide pitch, yaw, and roll control.

Test Conditions

Tests were conducted at the tunnel conditions shown in the following table:

Mach number	Stagnation temperature, K	Stagnation pressure, kPa	Reynolds number, m^{-1}
1.70	339	56.4	6.6×10^6
2.16	339	68.5	6.6
2.36	339	75.7	6.6
2.86	339	98.4	6.6

The dewpoint was maintained low enough to ensure negligible condensation effects. All tests were performed with boundary-layer transition strips on the body 3.05 cm aft of the nose and on the wing and tails 1.02 cm (measured streamwise) aft of the leading edges. The transition strips were approximately 0.16 cm wide and were composed of No. 50 sand grains sprinkled in acrylic plastic.

Measurements and Corrections

Aerodynamic forces and moments on the models were measured by means of a six-component electrical strain-gage balance which was housed within the model. Balance-chamber pressure was measured by means of a static-pressure orifice located near the balance.

The angles of attack and sideslip were corrected for deflections of the balance and sting due to aerodynamic loads. Also, the angles of attack were corrected for tunnel-flow misalignment. The drag and axial-force coefficients were adjusted to correspond to free-stream conditions acting over the model base.

PRESENTATION OF RESULTS

For the convenience of the reader tabulated values of the longitudinal aerodynamic, lateral-directional stability, roll-control, and yaw-control characteristics are given in 23 tables. A summary listing of the tables is given below:

Title	Table number					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Longitudinal aerodynamic characteristics	1	2	3	4	5	6
Lateral-directional stability characteristics	7	8	9	10	11	12
Roll-control characteristics:						
Two tail fins deflected	13	14	15	16	17(a)	18(a)
Three tail fins deflected					17(b)	18(b)
Yaw-control characteristics:						
One tail fin deflected	19	20	21			23(a)
Three tail fins deflected equally					22(a)	23(b)
Three tail fins deflected differentially					22(b)	23(c)

Selected data are presented in the following figures:

	Figure
Longitudinal aerodynamic characteristics at $M = 1.70$	2
Pitch-control characteristics for models 1, 3, and 5	3
Pitch-control characteristics for models 2, 4, and 6	4
Summary of longitudinal aerodynamic characteristics at $\alpha \approx 0°$	5
Lateral aerodynamic characteristics at $M = 1.70$	6
Lateral-directional stability characteristics	7
Summary of lateral-directional stability parameters at $\alpha \approx 0°$	8

Figure

Roll-control characteristics with two horizontal tail fins deflected:
Models 1, 3, and 5 9
Models 2, 4, and 6 10
Roll-control characteristics with two or three tail fins deflected:
Model 5 11
Model 6 12
Yaw-control characteristics with vertical tail fin deflected:
Models 1 and 3 13
Models 2 and 6 14
Yaw-control characteristics for model 5 with three tail fins deflected 15
Yaw-control characteristics for model 6 with one or three tail fins deflected 16
Roll- and yaw-control effectiveness per degree of total tail-fin deflection for models 5 and 6 at $\alpha \approx 0°$ 17

DISCUSSION

Longitudinal Aerodynamic Characteristics

The longitudinal aerodynamic characteristics (C_N, C_A, C_m, C_L, and C_D) are tabulated in tables 1 through 6. Examples of the characteristics at $M = 1.70$ for each model configuration are presented in figure 2. The data show that models 3 and 5, with the horizontal fins above the horizontal plane, experienced pitch-up ($\alpha \approx 5°$ to $16°$) as the horizontal tail fins moved through the wing wake. However, with further increases in angle of attack, these two configurations became stable as the horizontal tail fins dropped below the wing wake. With increases in pitch-control settings ($\delta_p = 0°$, $-10°$, $-20°$, and $-30°$), this pitch-up tendency decreased; however, the effect remained more noticeable for the configurations with largest horizontal fin-dihedral angle (model 5). The horizontal tail fins of all configurations were effective in producing pitch control throughout the test angle-of-attack and Mach number ranges. It should be noted that for models 3 and 5 (figs. 2(c) and 2(e)) with the largest negative pitch-control settings of $-20°$ and $-30°$, there is a kink in the C_D versus C_L curve near zero lift, which is also present in the results of references 2 and 3.

For the rest of the discussion, the configurations are grouped into those having the lower vertical tail fin and those having the upper vertical tail fin. Pitch-control characteristics for the models with the lower vertical fin (models 1, 3, and 5) with fin deflections of $0°$ and $-10°$ at all Mach numbers are compared in figure 3. The data show that the previously mentioned pitch-up of models 3 and 5 increased with increasing horizontal-fin-dihedral angle but tended to decrease with increasing Mach number. Pitch-control characteristics for the models with the upper vertical tail fin (models 2, 4, and 6) are compared in figure 4. These configurations had nearly linear pitching-moment characteristics with only a slight change in stability associated with increases in the magnitude of the horizontal-fin-dihedral angle.

A summary of the longitudinal aerodynamic characteristics at $\alpha \approx 0°$ is presented in figure 5. All the configurations had essentially the same pitch-control effectiveness $\left(C_{m_\delta}\right)$, lift-curve slope $\left(C_{L_\alpha}\right)$, and drag level at zero angle of attack $(C_{D,o})$.

Lateral-Directional Aerodynamic Characteristics

The lateral aerodynamic characteristics at $M = 1.70$ as a function of sideslip angle are presented in figure 6 for all model configurations with zero control deflections. These data are shown primarily to indicate the linear variation of the coefficients with sideslip angle, since all lateral-directional parameters (which are discussed later) were obtained from incremental results of tests made through the angle-of-attack range at $\beta = 0°$ and $3°$. The results were generally linear for all angles of attack and indicated that the lateral-directional parameters obtained at these sideslip angles are valid. Similar results were obtained for the other Mach numbers not shown.

The lateral-directional stability characteristics $\left(C_{Y_\beta},\ C_{n_\beta},\ \text{and}\ C_{l_\beta}\right)$ are tabulated in tables 7 to 12. The lateral-directional stability characteristics of the various models are compared in figure 7. The models with the lower vertical tail fin were directionally stable over a wider angle-of-attack range than those models with the upper vertical tail fin. At $\alpha = 0°$, the directional-stability parameter increased with increasing absolute value of the horizontal-fin-dihedral angle. For those configurations that became unstable at some angle of attack, the angle at which instability began decreased with increasing Mach number. All the models had positive effective dihedral $\left(\text{negative value of } C_{l_\beta}\right)$ at α greater than approximately 1° except for model 1, which had positive effective dihedral at moderate angles of attack at the lower Mach numbers.

A summary of the lateral-directional aerodynamic parameters at $\alpha \approx 0°$ is presented in figure 8. The data show that all the configurations were directionally stable at $\alpha \approx 0°$ over the entire Mach number range except for the configurations with horizontal-fin-dihedral angle of 0° (models 1 and 2), which were unstable at Mach numbers greater than approximately 2.6. The previously discussed effect of the magnitude of the horizontal-fin-dihedral angle on directional stability can be seen again. The configurations with the lower vertical tail fin tended to have negative effective dihedral, while the configurations with the upper vertical tail fin tended to have positive effective dihedral. The magnitude of C_{l_β} was greatest for a horizontal-fin-dihedral angle of 0° and decreased with increasing magnitude of the angle, so that for a horizontal-fin-dihedral angle of ±30°, $\left|C_{l_\beta}\right|$ had decreased to nearly zero.

The roll-control characteristics (C_Y, C_n, and C_l) are tabulated in tables 13 to 18. Roll-control characteristics for models 1, 3, and 5 (lower vertical tail fin) with the two horizontal tail fins deflected are compared in figure 9. At low angles of attack, all these configurations produced essentially the same increment in roll control at each Mach number. As angle of attack increased, the increment in roll control decreased slightly for 0° dihedral (model 1) and decreased further with increasing horizontal-fin-dihedral angle. Adverse yawing moment was produced for models 3 and 5 when $\delta_r = 10°$. This adverse yawing moment decreased with increases in either Mach number or angle of attack. Negligible adverse yawing moment was produced for model 1 at $\alpha = 0°$, but an increase in angle of attack produced adverse yawing moment. Increasing the horizontal-fin-dihedral angle from 22.5° (model 3) to 30° (model 5) increased the adverse yawing moment. Comparisons for models 2, 4, and 6 (upper vertical tail fin) are presented in figure 10. At each Mach number, all configurations again produced essentially the same rolling-moment increment at low

angles of attack. In fact, the increments were essentially the same as those in figure 9. With increasing angle of attack, the increment decreased slightly for the 0° horizontal-fin-dihedral configuration (model 2) with increases generally occurring for the larger horizontal-fin-dihedral angles. For models 2 and 4, the 10° roll-control deflection produced a proverse yawing moment which decreased with angle of attack for $M \leq 2.16$, but either remained fairly constant or increased with angle of attack at $M \geq 2.36$. Decreasing the horizontal-fin-dihedral angle from -22.5° to -30° increased the proverse yawing moment.

The lateral aerodynamic characteristics for roll control of model 5 with either two or three tail fins deflected are compared in figure 11. Over the angle-of-attack and Mach number ranges, three deflected fins produced more rolling moment than two deflected fins. At low angles of attack, three deflected fins produced little, if any, induced yawing moment, while two fins produced adverse yawing moment. With increasing angle of attack, three fins produced proverse yawing moment, while the two fins continued to produce adverse yawing moment. A comparison of these two configurations for model 6 is presented in figure 12. Again, three deflected fins produced more rolling moment than two deflected fins. At zero angle of attack, the yawing moment with three fins deflected was about zero becoming proverse at the higher angles of attack. However, the deflection of two tail fins produced proverse yawing moment.

The yaw-control characteristics (C_Y, C_n, and C_l) are tabulated in tables 19 to 23. Yaw-control characteristics for models 1 and 3 (lower vertical tail fin) with the vertical tail fin deflected ($\delta_n = -10°$) are compared in figure 13. Both configurations were effective in producing yawing moment, which increased with angle of attack and decreased with Mach number. The horizontal-fin-dihedral angle had negligible effect on either the yawing moment or the rolling moment. Proverse rolling moment was produced for both configurations. It decreased with increasing Mach number and increased with increasing angle of attack. Yaw-control characteristics for models 2 and 6 (upper vertical tail fin) with the vertical tail fin deflected ($\delta_n = -10°$) are compared in figure 14. Again, both configurations were effective in producing yawing moment which was unaffected by horizontal-fin-dihedral angle. This yawing moment decreased with either increasing Mach number or increasing angle of attack. Both configurations produced adverse rolling moment which was essentially unaffected by horizontal-fin-dihedral angle. This adverse rolling moment decreased with increasing Mach number and angle of attack.

The lateral aerodynamic characteristics for yaw control of model 5 with three tail fins deflected equally or differentially (vertical fin deflection twice the value of horizontal fin deflection) are compared in figure 15. At low angles of attack, both sets of fin deflections were effective in producing yaw control. The equally deflected tail fins produced the most yaw control. However, at the highest angles of attack, the equal deflection produced a significantly smaller increment in yawing moment relative to the differential deflection. The yaw-control effectiveness generally increased with increasing angle of attack and decreased with Mach number. The three equally deflected fins produced adverse rolling moment at the lower angles of attack, but produced proverse rolling moment at the higher angles of attack. The three differentially deflected fins produced essentially zero rolling moment at the lower angles of attack and a small proverse rolling moment at the higher angles of attack. Lateral aerodynamic characteristics for model 6 with one tail fin deflected or three tail fins deflected equally or differentially are compared in figure 16. All three configurations were effective in producing yaw control, with one deflected fin producing the least and three equally deflected fins producing the most control.

The yaw-control effectiveness decreased with increasing Mach number and angle of attack. At zero angle of attack, one deflected fin produced adverse rolling moment, while three deflected fins produced either zero rolling moment for differential deflection or proverse rolling moment for equal deflection.

The roll- and yaw-control characteristics per degree of total tail-fin deflection for models 5 and 6 with various combinations of control settings are compared in figure 17. The roll-control characteristics for the models with two horizontal tail fins deflected collapsed into a single curve (solid line) as shown in figure 17(a). Likewise, the roll-control characteristics for the models with three tail fins deflected collapsed into a single curve (dashed line). The two deflected horizontal tail fins for roll control were more effective at $M \leq 2.0$ than the three deflected fins; however, with increasing Mach number the three deflected fins became more effective. The yaw-control characteristics for the models collapsed into single curves for the vertical tail fin deflected (solid line) as shown in figure 17(b), the three tail fins deflected equally (dashed line), or the three tail fins deflected differentially (short-long dashed line). Deflection of the single vertical tail fin for yaw-control deflection was the most effective, and equal deflection of the three tail fins was the least effective.

CONCLUSIONS

An experimental wind-tunnel investigation has been made to determine the longitudinal and lateral-directional stability and control characteristics of six triform-tail-fin arrangements of a monoplanar missile model. The tail-fin arrangements consisted of either a lower vertical tail fin with a pair of horizontal fins having 0°, 22.5°, or 30° dihedral or an upper vertical tail fin with horizontal fins having 0°, -22.5°, or -30° dihedral. Various combinations of tail-fin deflections provided pitch, yaw, and roll control. The following results were obtained from the investigation:

1. The configurations with the horizontal fins at or below the horizontal plane had nearly linear pitching-moment characteristics. The configurations with the horizontal fins above the horizontal plane experienced pitch-up, which decreased with increasing angle of attack and Mach number but increased with increasing horizontal-fin-dihedral angle.

2. At zero angle of attack, all the configurations produced essentially the same pitch-control effectiveness, lift-curve slope, and drag level.

3. For the center of gravity used, all the configurations were directionally stable over the Mach number range at zero angle of attack except for the configurations with 0° horizontal-fin-dihedral angle, which became unstable at Mach numbers above approximately 2.6. The directional stability increased with an increase in the magnitude of the horizontal-fin-dihedral angle and, for the lower vertical fin, was maintained to higher angles of attack.

4. Generally, those configurations with the upper vertical tail fin had positive effective dihedral at zero angle of attack, whereas those with the lower vertical fin had negative effective dihedral. For both the upper and lower vertical fin configurations, reducing the magnitude of the horizontal-fin-dihedral angle increased the magnitude of the lateral stability parameter.

5. All the configurations with the horizontal fins deflected for roll control had essentially the same roll-control effectiveness at zero angle of attack. The yaw-control effectiveness of the vertical fin was essentially unchanged by the horizontal-fin-dihedral angle.

6. For roll control, the three tail fins deflected produced more total roll control than the horizontal fins. The two horizontal fins were more effective per degree of total tail fin deflection below a Mach number of approximately 2.0, but less effective above a Mach number of approximately 2.0. For yaw control, the three tail fins deflected equally or differentially produced more total yaw control than the single vertical fin. The three fins deflected equally produced the most total yaw control. However, the effectiveness per degree of total tail-fin deflection was greatest for the single vertical fin deflected and least for the three fins deflected equally.

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TABLE 1.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 1

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.04	.0244	.0357	-.0247	.0257	.0348
-1.02	.0544	.0365	-.0270	.0550	.0355
.01	.0807	.0370	-.0289	.0807	.0370
1.00	.1058	.0372	-.0305	.1052	.0390
2.00	.1347	.0378	-.0330	.1333	.0425
4.01	.2020	.0400	-.0393	.1987	.0540
6.01	.2685	.0415	-.0454	.2627	.0694
7.98	.3393	.0435	-.0523	.3300	.0902
10.02	.4195	.0462	-.0601	.4050	.1186
12.03	.4983	.0489	-.0672	.4771	.1517
16.01	.6630	.0525	-.0795	.6229	.2333
19.99	.8319	.0555	-.0886	.7629	.3365
21.99	.9151	.0565	-.0927	.8273	.3951
$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.06	-.1418	.0381	.0340	-.1403	.0432
-.99	-.1092	.0370	.0309	-.1085	.0389
.01	-.0839	.0371	.0292	-.0839	.0370
.95	-.0598	.0368	.0276	-.0604	.0358
1.99	-.0321	.0362	.0256	-.0334	.0351
4.00	.0325	.0349	.0200	.0300	.0370
6.01	.1029	.0330	.0130	.0989	.0436
8.01	.1788	.0305	.0051	.1728	.0552
10.01	.2591	.0275	-.0033	.2504	.0722
12.01	.3376	.0243	-.0105	.3252	.0940
16.03	.5078	.0183	-.0250	.4830	.1578
20.05	.6993	.0101	-.0410	.6535	.2493
22.00	.7878	.0070	-.0471	.7278	.3017
$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.02	-.2571	.1256	.0751	-.2525	.1346
-.98	-.2181	.1194	.0697	-.2161	.1231
-.05	-.1945	.1182	.0679	-.1944	.1183
1.03	-.1717	.1194	.0675	-.1738	.1163
2.05	-.1525	.1225	.0686	-.1568	.1170
4.00	-.0962	.1198	.0650	-.1043	.1128
6.02	-.0257	.1131	.0583	-.0375	.1098
8.00	.0513	.1047	.0502	.0362	.1108
9.97	.1259	.0971	.0428	.1072	.1175
11.99	.2059	.0908	.0359	.1825	.1316
16.02	.3779	.0738	.0216	.3429	.1752
20.01	.5614	.0522	.0074	.5097	.2412
22.02	.6522	.0427	.0009	.5886	.2841

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.97	-.0528	.0233	.0041	-.0520	.0251
-.96	-.0241	.0233	.0017	-.0237	.0237
.04	.0016	.0234	-.0002	.0016	.0234
1.04	.0266	.0234	-.0020	.0262	.0239
2.04	.0542	.0234	-.0042	.0533	.0253
4.03	.1172	.0239	-.0098	.1153	.0320
6.03	.1885	.0244	-.0170	.1849	.0441
8.03	.2635	.0245	-.0247	.2575	.0611
10.01	.3398	.0244	-.0325	.3303	.0831
12.02	.4212	.0242	-.0399	.4069	.1114
15.98	.5860	.0234	-.0537	.5569	.1838
20.01	.7729	.0215	-.0674	.7188	.2847
22.04	.8639	.0217	-.0733	.7926	.3442
$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.02	-.2144	.0752	.0598	-.2116	.0827
-1.01	-.1816	.0730	.0563	-.1803	.0762
-.01	-.1571	.0726	.0547	-.1571	.0726
1.00	-.1324	.0721	.0533	-.1336	.0698
2.01	-.1054	.0715	.0517	-.1079	.0677
4.02	-.0421	.0685	.0464	-.0468	.0654
6.01	.0286	.0639	.0392	.0217	.0666
7.99	.1050	.0583	.0307	.0959	.0723
10.03	.1880	.0525	.0219	.1760	.0844
12.01	.2663	.0478	.0147	.2505	.1021
16.01	.4371	.0361	.0005	.4102	.1553
20.00	.6244	.0199	-.0150	.5799	.2322
21.97	.7140	.0135	-.0213	.6571	.2797

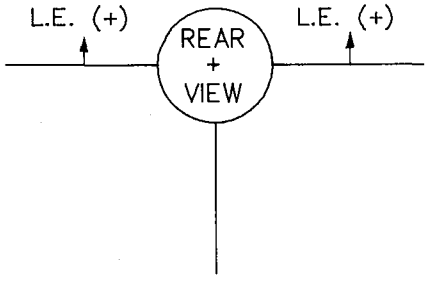


TABLE 1.- Continued

(b) M = 2.16

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.19	.0077	.0301	-.0183	.0088	.0298
-1.25	.0343	.0308	-.0204	.0350	.0301
-.24	.0605	.0314	-.0221	.0606	.0312
.76	.0847	.0316	-.0235	.0843	.0328
1.78	.1123	.0321	-.0256	.1113	.0355
2.77	.1422	.0329	-.0283	.1405	.0398
3.78	.1734	.0342	-.0309	.1708	.0455
5.79	.2354	.0354	-.0362	.2307	.0590
7.79	.2980	.0369	-.0414	.2902	.0769
9.79	.3650	.0388	-.0471	.3531	.1003
11.77	.4324	.0403	-.0522	.4151	.1277
15.79	.5782	.0447	-.0615	.5442	.2003
19.78	.7225	.0475	-.0699	.6638	.2892

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.21	-.1176	.0325	.0261	-.1163	.0370
-1.21	-.0894	.0320	.0239	-.0887	.0338
-.21	-.0647	.0319	.0224	-.0646	.0322
.80	-.0400	.0315	.0209	-.0404	.0309
1.79	-.0134	.0307	.0189	-.0144	.0303
2.79	.0174	.0298	.0164	.0159	.0306
3.77	.0476	.0286	.0137	.0456	.0317
5.78	.1128	.0260	.0073	.1096	.0372
7.77	.1777	.0234	.0010	.1729	.0472
9.83	.2467	.0206	-.0053	.2396	.0624
11.79	.3154	.0181	-.0107	.3051	.0822
15.78	.4673	.0124	-.0225	.4463	.1391
19.82	.6173	.0090	-.0323	.5777	.2178

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.22	-.2192	.1104	.0622	-.2147	.1188
-1.24	-.1915	.1084	.0599	-.1891	.1125
-.20	-.1655	.1074	.0583	-.1651	.1080
.79	-.1426	.1064	.0571	-.1441	.1044
1.81	-.1169	.1053	.0558	-.1202	.1016
3.79	-.0576	.0998	.0509	-.0640	.0957
5.80	.0093	.0911	.0437	.0001	.0916
7.75	.0788	.0817	.0359	.0671	.0916
9.85	.1512	.0739	.0290	.1364	.0986
11.77	.2180	.0672	.0237	.1997	.1103
15.74	.3726	.0483	.0103	.3456	.1476
19.75	.5180	.0381	.0013	.4746	.2109
21.78	.5919	.0357	-.0022	.5364	.2528

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.21	-.0573	.0204	.0042	-.0564	.0225
-1.23	-.0303	.0204	.0021	-.0298	.0210
-.23	-.0046	.0204	.0004	-.0045	.0205
.82	.0213	.0205	-.0013	.0210	.0208
1.78	.0475	.0205	-.0033	.0468	.0219
3.79	.1072	.0207	-.0083	.1056	.0277
5.79	.1717	.0210	-.0143	.1687	.0383
7.79	.2371	.0213	-.0203	.2320	.0532
9.78	.3037	.0208	-.0263	.2958	.0721
11.78	.3728	.0211	-.0316	.3606	.0968
15.80	.5222	.0204	-.0422	.4969	.1618
19.82	.6706	.0206	-.0514	.6240	.2467
21.78	.7484	.0208	-.0567	.6872	.2970

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.1762	.0636	.0463	-.1736	.0704
-1.21	-.1470	.0624	.0439	-.1456	.0655
-.24	-.1228	.0619	.0424	-.1225	.0624
.77	-.0984	.0609	.0408	-.0992	.0596
1.81	-.0696	.0595	.0388	-.0715	.0573
3.76	-.0121	.0562	.0341	-.0157	.0553
5.79	.0552	.0511	.0274	.0497	.0564
7.79	.1235	.0452	.0202	.1163	.0615
9.77	.1936	.0393	.0134	.1841	.0716
11.79	.2649	.0339	.0074	.2524	.0873
15.82	.4197	.0219	-.0055	.3979	.1355
19.77	.5622	.0158	-.0137	.5237	.2050
21.78	.6366	.0138	-.0177	.5860	.2490

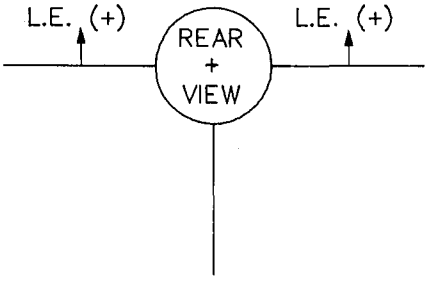


TABLE 1.- Continued

(c) M = 2.36

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.82	.0122	.0285	-.0169	.0131	.0281
-.84	.0371	.0293	-.0190	.0375	.0287
.09	.0576	.0297	-.0204	.0576	.0298
1.12	.0825	.0300	-.0221	.0819	.0316
2.17	.1124	.0307	-.0244	.1111	.0349
4.18	.1776	.0330	-.0298	.1747	.0459
6.15	.2278	.0343	-.0339	.2228	.0585
8.20	.2874	.0357	-.0387	.2793	.0764
10.16	.3496	.0375	-.0437	.3375	.0986
12.16	.4169	.0396	-.0486	.3992	.1265
16.13	.5477	.0430	-.0566	.5142	.1934
20.17	.6926	.0468	-.0665	.6340	.2827
22.16	.7710	.0491	-.0718	.6955	.3364

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.85	-.1032	.0298	.0238	-.1022	.0331
-.82	-.0781	.0294	.0219	-.0777	.0305
.15	-.0542	.0291	.0203	-.0542	.0290
1.14	-.0317	.0286	.0188	-.0323	.0280
2.13	-.0069	.0278	.0167	-.0079	.0275
4.13	.0506	.0259	.0117	.0486	.0295
6.16	.1113	.0236	.0060	.1081	.0354
8.11	.1708	.0213	.0005	.1661	.0452
10.16	.2375	.0184	-.0054	.2306	.0600
12.16	.3041	.0157	-.0106	.2939	.0794
16.14	.4414	.0117	-.0204	.4207	.1340
20.16	.5777	.0100	-.0285	.5389	.2085
22.14	.6464	.0091	-.0324	.5953	.2520

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.82	-.1955	.1041	.0579	-.1920	.1103
-.86	-.1741	.1032	.0564	-.1726	.1058
1.13	-.1314	.1010	.0536	-.1333	.0984
2.16	-.1053	.0990	.0517	-.1090	.0950
4.17	-.0401	.0924	.0457	-.0467	.0893
6.16	.0218	.0837	.0390	.0126	.0855
8.18	.0931	.0737	.0311	.0817	.0862
10.18	.1521	.0659	.0256	.1380	.0917
12.17	.2210	.0579	.0197	.2039	.1032
16.15	.3582	.0439	.0084	.3319	.1418
20.14	.4910	.0383	.0020	.4478	.2050
22.16	.5622	.0368	-.0009	.5068	.2461
.13	-.1530	.1021	.0550	-.1533	.1017

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.90	-.0509	.0195	.0038	-.0503	.0212
-.84	-.0226	.0194	.0017	-.0223	.0197
.22	.0082	.0191	-.0003	.0081	.0191
1.18	.0295	.0191	-.0019	.0291	.0197
2.17	.0510	.0193	-.0037	.0502	.0212
4.19	.1094	.0198	-.0085	.1077	.0277
6.19	.1733	.0199	-.0142	.1702	.0385
8.18	.2290	.0200	-.0191	.2238	.0524
10.15	.2922	.0199	-.0242	.2841	.0711
12.16	.3568	.0198	-.0292	.3446	.0945
16.13	.4956	.0200	-.0387	.4705	.1569
20.16	.6329	.0206	-.0473	.5870	.2374
22.15	.7095	.0212	-.0527	.6492	.2871

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.87	-.1560	.0591	.0424	-.1540	.0642
-.87	-.1313	.0583	.0405	-.1304	.0603
.16	-.1054	.0576	.0388	-.1055	.0574
1.17	-.0810	.0567	.0371	-.0821	.0550
2.16	-.0576	.0554	.0353	-.0596	.0532
4.13	-.0078	.0522	.0310	-.0115	.0515
6.16	.0643	.0460	.0237	.0590	.0527
8.14	.1254	.0403	.0175	.1184	.0577
10.14	.1918	.0340	.0107	.1829	.0672
12.15	.2590	.0289	.0051	.2471	.0828
16.19	.4036	.0202	-.0053	.3819	.1319
20.15	.5315	.0164	-.0119	.4933	.1985
22.16	.6029	.0150	-.0154	.5527	.2413

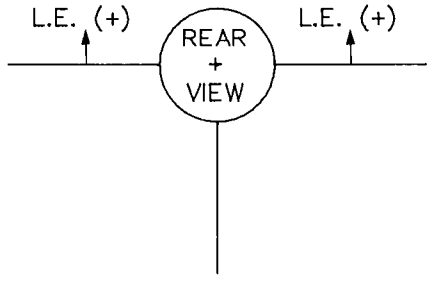


TABLE 1.- Concluded

(d) M = 2.86

δ_p = 10°					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	-.0051	.0226	-.0125	-.0043	.0228
-1.10	.0221	.0235	-.0147	.0226	.0230
-.09	.0451	.0240	-.0163	.0451	.0240
.92	.0644	.0244	-.0175	.0640	.0255
1.94	.0890	.0250	-.0191	.0881	.0280
3.91	.1356	.0267	-.0226	.1335	.0359
5.91	.1846	.0286	-.0259	.1807	.0475
7.89	.2352	.0305	-.0292	.2288	.0625
9.92	.2908	.0327	-.0323	.2809	.0823
11.89	.3494	.0352	-.0364	.3346	.1064
15.90	.4698	.0396	-.0433	.4409	.1668
19.93	.6017	.0447	-.0518	.5504	.2471
21.93	.6772	.0479	-.0576	.6103	.2973

δ_p = -10°					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.14	-.0958	.0247	.0193	-.0948	.0282
-1.11	-.0737	.0242	.0177	-.0733	.0256
-.10	-.0486	.0238	.0160	-.0486	.0239
.92	-.0265	.0235	.0146	-.0268	.0230
1.91	-.0034	.0227	.0128	-.0042	.0226
3.87	.0460	.0212	.0088	.0445	.0242
5.89	.0953	.0198	.0048	.0928	.0295
7.90	.1516	.0180	.0006	.1477	.0387
9.91	.2065	.0160	-.0032	.2006	.0513
11.91	.2616	.0148	-.0062	.2529	.0684
15.90	.3761	.0139	-.0113	.3579	.1164
19.87	.4978	.0137	-.0165	.4635	.1821
21.93	.5694	.0138	-.0200	.5231	.2254

δ_p = -30°					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.09	-.1774	.0903	.0492	-.1740	.0967
-1.12	-.1583	.0894	.0479	-.1565	.0925
-.13	-.1372	.0885	.0467	-.1370	.0888
.91	-.1158	.0870	.0452	-.1172	.0851
1.91	-.0881	.0848	.0431	-.0909	.0818
3.94	-.0365	.0789	.0386	-.0418	.0762
5.91	.0158	.0702	.0329	.0085	.0714
7.89	.0791	.0598	.0259	.0702	.0701
9.89	.1354	.0530	.0212	.1243	.0755
11.90	.1975	.0473	.0166	.1835	.0871
15.90	.3069	.0438	.0127	.2831	.1262
19.90	.4226	.0432	.0100	.3827	.1844
21.90	.4820	.0443	.0090	.4307	.2209

δ_p = 0°					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.12	-.0499	.0159	.0032	-.0493	.0178
-1.10	-.0235	.0159	.0014	-.0232	.0163
-.11	-.0024	.0158	0.0000	-.0023	.0158
.93	.0209	.0160	-.0014	.0207	.0163
1.92	.0421	.0160	-.0029	.0415	.0174
3.92	.0912	.0166	-.0066	.0899	.0228
5.92	.1419	.0173	-.0103	.1393	.0319
7.89	.1900	.0178	-.0135	.1857	.0437
9.91	.2454	.0179	-.0168	.2386	.0598
11.90	.3064	.0185	-.0206	.2960	.0812
15.91	.4208	.0199	-.0264	.3993	.1345
19.94	.5543	.0219	-.0341	.5136	.2096
21.91	.6267	.0232	-.0391	.5728	.2554

δ_p = -20°					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.11	-.1447	.0504	.0356	-.1428	.0557
-1.09	-.1183	.0497	.0337	-.1173	.0519
-.11	-.0985	.0493	.0325	-.0984	.0495
.91	-.0718	.0483	.0309	-.0725	.0472
1.95	-.0490	.0469	.0291	-.0506	.0452
3.92	-.0003	.0422	.0246	-.0032	.0421
5.91	.0569	.0370	.0189	.0528	.0427
7.93	.1177	.0310	.0129	.1123	.0470
9.91	.1724	.0272	.0086	.1651	.0564
11.91	.2316	.0242	.0048	.2216	.0715
15.89	.3418	.0218	.0009	.3228	.1146
19.91	.4566	.0212	-.0020	.4221	.1754
21.92	.5228	.0214	-.0044	.4770	.2150

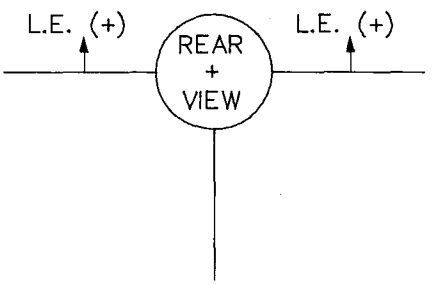


TABLE 2.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 2

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.30	.0184	.0358	-.0241	.0198	.0350
-1.30	.0475	.0364	-.0265	.0484	.0353
-.28	.0735	.0369	-.0283	.0737	.0365
.71	.0987	.0370	-.0299	.0982	.0382
1.72	.1277	.0375	-.0324	.1265	.0413
3.73	.1928	.0393	-.0385	.1899	.0518
5.71	.2617	.0407	-.0448	.2563	.0665
7.72	.3340	.0423	-.0516	.3253	.0868
9.72	.4106	.0446	-.0589	.3972	.1132
11.73	.4906	.0470	-.0658	.4708	.1457
15.70	.6511	.0502	-.0780	.6133	.2245
19.74	.8274	.0533	-.0877	.7607	.3296
21.72	.9111	.0542	-.0918	.8264	.3875

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.33	-.1465	.0378	.0343	-.1448	.0437
-1.31	-.1144	.0369	.0312	-.1135	.0396
-.32	-.0892	.0368	.0295	-.0890	.0373
.73	-.0631	.0365	.0277	-.0636	.0357
1.70	-.0371	.0357	.0258	-.0382	.0346
3.71	.0264	.0343	.0203	.0241	.0359
5.69	.0977	.0322	.0135	.0940	.0417
7.69	.1715	.0295	.0058	.1660	.0521
9.70	.2498	.0264	-.0022	.2418	.0681
11.73	.3308	.0232	-.0098	.3192	.0900
15.71	.5017	.0174	-.0239	.4782	.1526
19.70	.6897	.0091	-.0392	.6462	.2411
21.70	.7776	.0060	-.0453	.7203	.2930

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.29	-.0629	.0234	.0051	-.0619	.0259
-1.28	-.0340	.0234	.0027	-.0334	.0241
-.32	-.0083	.0233	.0007	-.0082	.0233
.72	.0177	.0234	-.0011	.0174	.0236
1.70	.0456	.0232	-.0033	.0449	.0245
3.72	.1090	.0234	-.0088	.1073	.0304
5.71	.1792	.0238	-.0157	.1760	.0415
7.70	.2536	.0241	-.0232	.2481	.0578
9.73	.3341	.0239	-.0313	.3252	.0800
11.69	.4098	.0235	-.0380	.3965	.1060
15.70	.5773	.0222	-.0515	.5497	.1776
19.68	.7603	.0205	-.0649	.7090	.2754
21.73	.8513	.0196	-.0707	.7835	.3334

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D

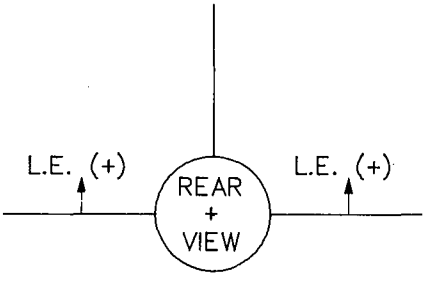


TABLE 2.- Continued

(b) M = 2.16

$\delta_p = 10°$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = -10°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.28	-.1226	.0326	.0266	-.1212	.0375
-1.25	-.0929	.0321	.0242	-.0922	.0341
-.25	-.0680	.0319	.0227	-.0678	.0322
.71	-.0449	.0314	.0212	-.0453	.0309
1.74	-.0167	.0306	.0191	-.0176	.0301
3.77	.0444	.0284	.0140	.0425	.0313
5.74	.1084	.0258	.0077	.1052	.0365
7.75	.1762	.0230	.0012	.1715	.0465
9.75	.2432	.0200	-.0049	.2363	.0609
11.75	.3118	.0174	-.0104	.3017	.0805
15.75	.4638	.0117	-.0221	.4432	.1371
19.74	.6136	.0078	-.0316	.5749	.2146
21.72	.6895	.0063	-.0363	.6382	.2610

$\delta_p = -30°$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = 0°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.0590	.0208	.0043	-.0582	.0231
-1.26	-.0314	.0206	.0022	-.0309	.0213
-.23	-.0049	.0206	.0005	-.0048	.0206
.75	.0189	.0206	-.0011	.0186	.0208
1.75	.0459	.0204	-.0031	.0453	.0218
3.79	.1067	.0203	-.0082	.1051	.0274
5.77	.1690	.0204	-.0140	.1661	.0373
7.77	.2347	.0203	-.0200	.2298	.0519
9.76	.3010	.0201	-.0258	.2933	.0708
11.76	.3692	.0200	-.0311	.3574	.0948
15.75	.5179	.0192	-.0414	.4932	.1591
19.76	.6657	.0183	-.0505	.6203	.2422
21.78	.7435	.0179	-.0556	.6838	.2925

$\delta_p = -20°$					
α,deg	C_N	C_A	C_m	C_L	C_D

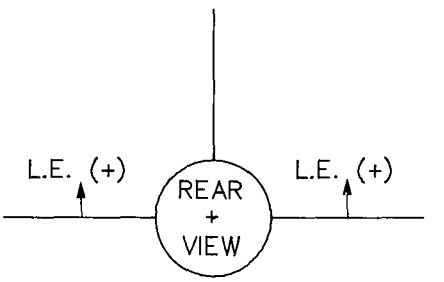


TABLE 2.- Continued

(c) M = 2.36

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.09	-.1128	.0307	.0245	-.1116	.0348
-1.07	-.0837	.0301	.0222	-.0831	.0317
-.07	-.0627	.0298	.0208	-.0627	.0299
.95	-.0338	.0292	.0189	-.0343	.0287
1.94	-.0057	.0283	.0165	-.0066	.0281
3.95	.0461	.0265	.0119	.0442	.0296
5.91	.1080	.0240	.0062	.1049	.0350
7.96	.1806	.0207	-.0007	.1760	.0455
9.97	.2422	.0180	-.0059	.2355	.0596
11.96	.3037	.0156	-.0106	.2938	.0782
15.98	.4531	.0109	-.0217	.4326	.1352
19.93	.5842	.0083	-.0293	.5464	.2069
21.95	.6619	.0070	-.0340	.6113	.2540

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.06	-.0526	.0196	.0037	-.0518	.0214
-1.12	-.0273	.0193	.0019	-.0269	.0199
-.07	.0001	.0192	0.0000	.0002	.0192
.93	.0243	.0192	-.0017	.0240	.0196
1.95	.0494	.0192	-.0037	.0487	.0209
3.91	.1017	.0194	-.0081	.1001	.0262
5.98	.1647	.0195	-.0136	.1618	.0366
7.94	.2258	.0193	-.0190	.2210	.0503
9.98	.2909	.0191	-.0243	.2832	.0692
11.93	.3530	.0188	-.0288	.3415	.0914
15.93	.4895	.0186	-.0380	.4656	.1522
19.98	.6366	.0182	-.0477	.5920	.2347
21.93	.7023	.0182	-.0517	.6447	.2792

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D

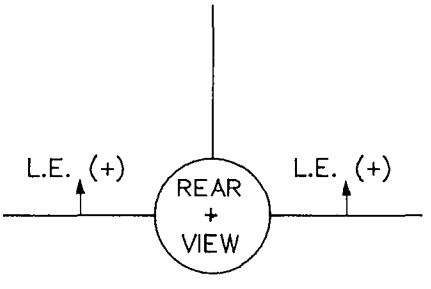


TABLE 2.- Concluded

(d) M = 2.86

$\delta_p = 10°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.0096	.0224	-.0118	-.0088	.0227
-1.19	.0184	.0233	-.0141	.0188	.0229
-.16	.0398	.0237	-.0156	.0398	.0236
.80	.0572	.0240	-.0167	.0569	.0248
1.83	.0792	.0244	-.0181	.0784	.0269
3.81	.1311	.0260	-.0218	.1291	.0347
5.83	.1810	.0279	-.0252	.1773	.0462
7.82	.2307	.0294	-.0282	.2245	.0605
9.81	.2859	.0313	-.0314	.2764	.0795
11.81	.3463	.0338	-.0355	.3321	.1039
15.81	.4602	.0373	-.0416	.4327	.1613
19.83	.5930	.0420	-.0499	.5436	.2406
21.83	.6677	.0448	-.0555	.6031	.2899

$\delta_p = -10°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.21	-.0961	.0251	.0198	-.0951	.0288
-1.20	-.0729	.0246	.0180	-.0724	.0261
-.26	-.0546	.0242	.0168	-.0545	.0245
.78	-.0297	.0238	.0152	-.0300	.0234
1.82	-.0048	.0231	.0133	-.0055	.0229
3.80	.0464	.0212	.0091	.0449	.0242
5.78	.0939	.0197	.0052	.0914	.0291
7.81	.1536	.0175	.0006	.1498	.0382
9.77	.2063	.0153	-.0030	.2007	.0500
11.77	.2654	.0139	-.0065	.2570	.0678
15.76	.3780	.0125	-.0113	.3604	.1147
19.81	.5049	.0118	-.0169	.4710	.1822
21.80	.5707	.0115	-.0199	.5257	.2226

$\delta_p = -30°$					
α,deg	C_N	C_A	C_m	C_L	C_D

$\delta_p = 0°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.20	-.0489	.0165	.0034	-.0482	.0184
-1.24	-.0296	.0163	.0019	-.0292	.0169
-.18	-.0026	.0161	.0003	-.0025	.0161
.84	.0165	.0161	-.0009	.0163	.0163
1.80	.0408	.0162	-.0026	.0403	.0175
3.84	.0918	.0166	-.0063	.0905	.0227
5.82	.1401	.0170	-.0100	.1376	.0311
7.82	.1945	.0171	-.0136	.1903	.0435
9.79	.2475	.0171	-.0169	.2410	.0590
11.80	.3051	.0174	-.0203	.2951	.0794
15.84	.4260	.0182	-.0265	.4049	.1338
19.80	.5551	.0194	-.0339	.5157	.2063
21.78	.6220	.0203	-.0377	.5701	.2497

$\delta_p = -20°$					
α,deg	C_N	C_A	C_m	C_L	C_D

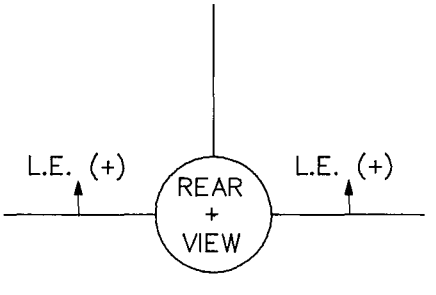


TABLE 3.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 3

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.18	.0166	.0344	-.0213	.0179	.0338
-1.20	.0487	.0361	-.0246	.0494	.0350
-.17	.0777	.0374	-.0275	.0778	.0371
.83	.1066	.0385	-.0305	.1060	.0401
1.83	.1377	.0395	-.0334	.1364	.0439
3.84	.1955	.0403	-.0372	.1924	.0533
5.80	.2458	.0398	-.0374	.2405	.0644
7.82	.2903	.0367	-.0345	.2826	.0759
9.81	.3390	.0345	-.0328	.3282	.0917
11.82	.3985	.0333	-.0343	.3832	.1142
15.81	.5444	.0340	-.0404	.5146	.1810
19.83	.7123	.0359	-.0479	.6578	.2754
21.81	.7955	.0384	-.0534	.7243	.3312

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.23	-.1493	.0400	.0368	-.1477	.0458
-1.20	-.1174	.0393	.0336	-.1165	.0418
-.18	-.0884	.0386	.0305	-.0883	.0388
.85	-.0587	.0377	.0275	-.0592	.0368
1.84	-.0298	.0367	.0249	-.0310	.0357
3.82	.0305	.0355	.0203	.0281	.0374
5.84	.0875	.0356	.0185	.0834	.0443
7.84	.1381	.0362	.0191	.1319	.0547
9.85	.2040	.0340	.0156	.1952	.0683
11.82	.2819	.0305	.0078	.2696	.0876
15.81	.4479	.0246	-.0056	.4243	.1457
19.82	.6254	.0179	-.0163	.5823	.2289
21.86	.7178	.0143	-.0226	.6609	.2805

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	-.2747	.1407	.0835	-.2693	.1508
-1.14	-.2465	.1389	.0810	-.2437	.1438
-.14	-.2182	.1363	.0782	-.2179	.1368
.87	-.1901	.1339	.0756	-.1921	.1310
1.87	-.1608	.1315	.0729	-.1650	.1262
3.86	-.0963	.1248	.0666	-.1044	.1180
5.87	-.0289	.1181	.0606	-.0408	.1145
7.87	.0321	.1118	.0576	.0165	.1151
9.87	.1106	.1026	.0495	.0913	.1201
11.87	.1851	.0989	.0437	.1608	.1349
15.86	.3611	.0784	.0264	.3260	.1741
19.86	.5415	.0588	.0129	.4893	.2393
21.91	.6328	.0504	.0072	.5683	.2828

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.20	-.0650	.0242	.0068	-.0641	.0266
-1.19	-.0332	.0244	.0035	-.0327	.0251
-.16	-.0027	.0245	.0003	-.0027	.0246
.82	.0252	.0246	-.0025	.0249	.0250
1.83	.0539	.0244	-.0052	.0531	.0261
3.84	.1154	.0247	-.0099	.1135	.0323
5.82	.1701	.0245	-.0114	.1668	.0416
7.81	.2184	.0246	-.0095	.2130	.0540
9.84	.2722	.0234	-.0092	.2642	.0696
11.84	.3429	.0224	-.0133	.3310	.0923
15.82	.4984	.0211	-.0234	.4738	.1561
19.80	.6674	.0199	-.0327	.6212	.2447
21.85	.7625	.0195	-.0393	.7005	.3018

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.17	-.2278	.0825	.0659	-.2245	.0911
-1.19	-.1965	.0807	.0626	-.1948	.0847
-.22	-.1692	.0791	.0599	-.1689	.0798
.84	-.1397	.0774	.0570	-.1408	.0753
1.86	-.1085	.0755	.0541	-.1109	.0720
3.84	-.0476	.0729	.0491	-.0524	.0695
5.81	.0098	.0720	.0460	.0024	.0726
7.81	.0697	.0703	.0443	.0595	.0792
9.83	.1478	.0636	.0366	.1347	.0879
11.82	.2318	.0565	.0271	.2153	.1028
15.84	.4037	.0444	.0120	.3762	.1529
19.82	.5818	.0309	-.0003	.5369	.2263
21.80	.6695	.0251	-.0061	.6123	.2719

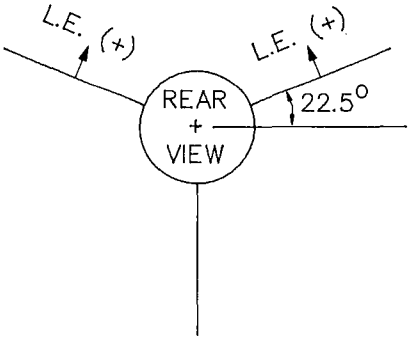


TABLE 3.- Continued

(b) M = 2.16

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.22	-.0026	.0273	-.0148	-.0016	.0274
-1.21	.0269	.0286	-.0175	.0275	.0280
-.22	.0541	.0299	-.0201	.0542	.0297
.79	.0822	.0310	-.0226	.0817	.0321
1.77	.1095	.0318	-.0249	.1085	.0352
3.81	.1677	.0333	-.0290	.1651	.0444
5.76	.2164	.0336	-.0300	.2119	.0552
7.79	.2589	.0320	-.0282	.2521	.0668
9.76	.3019	.0290	-.0266	.2926	.0798
11.81	.3571	.0275	-.0271	.3439	.1000
15.79	.4906	.0293	-.0325	.4641	.1617
19.80	.6334	.0328	-.0404	.5849	.2454
21.78	.7073	.0352	-.0446	.6438	.2951

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.25	-.1253	.0344	.0279	-.1238	.0393
-1.24	-.0957	.0334	.0250	-.0950	.0354
-.22	-.0675	.0324	.0224	-.0674	.0326
.72	-.0408	.0315	.0200	-.0412	.0310
1.77	-.0113	.0304	.0174	-.0122	.0300
3.77	.0464	.0288	.0131	.0444	.0318
5.77	.1004	.0283	.0108	.0971	.0383
7.79	.1538	.0277	.0093	.1486	.0483
9.76	.2144	.0256	.0056	.2069	.0616
11.79	.2830	.0231	.0003	.2723	.0805
15.79	.4301	.0174	-.0097	.4091	.1338
19.76	.5767	.0138	-.0189	.5381	.2080
21.82	.6552	.0122	-.0234	.6037	.2549

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.32	-.2368	.1229	.0696	-.2316	.1324
-1.31	-.2071	.1205	.0670	-.2043	.1252
-.30	-.1802	.1179	.0645	-.1795	.1188
.70	-.1536	.1154	.0621	-.1550	.1135
1.70	-.1256	.1130	.0597	-.1289	.1092
3.70	-.0687	.1087	.0552	-.0756	.1041
5.70	-.0100	.1029	.0507	-.0202	.1014
7.70	.0602	.0907	.0434	.0475	.0980
9.71	.1307	.0816	.0357	.1151	.1025
11.70	.2071	.0706	.0274	.1885	.1112
15.71	.3692	.0490	.0121	.3422	.1471
19.70	.5183	.0369	.0020	.4755	.2095
21.71	.5914	.0326	-.0018	.5374	.2491

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.0622	.0201	.0053	-.0613	.0225
-1.24	-.0323	.0202	.0027	-.0319	.0209
-.21	-.0050	.0204	.0003	-.0049	.0205
.79	.0224	.0205	-.0021	.0221	.0208
1.79	.0498	.0203	-.0043	.0491	.0219
3.77	.1060	.0203	-.0083	.1044	.0272
5.80	.1591	.0204	-.0105	.1563	.0363
7.79	.2068	.0201	-.0105	.2021	.0479
9.76	.2567	.0191	-.0109	.2498	.0624
11.78	.3182	.0185	-.0136	.3077	.0831
15.77	.4582	.0182	-.0210	.4360	.1420
19.78	.6048	.0184	-.0299	.5629	.2220
21.81	.6824	.0187	-.0343	.6266	.2709

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.25	-.1843	.0692	.0500	-.1814	.0764
-1.25	-.1543	.0673	.0472	-.1528	.0706
-.21	-.1260	.0654	.0446	-.1258	.0659
.76	-.0997	.0637	.0423	-.1006	.0623
1.80	-.0697	.0618	.0397	-.0716	.0596
3.76	-.0152	.0593	.0360	-.0191	.0582
5.78	.0404	.0574	.0330	.0344	.0612
7.77	.1040	.0520	.0278	.0960	.0656
9.79	.1751	.0453	.0202	.1648	.0744
11.77	.2463	.0396	.0135	.2330	.0890
15.79	.4018	.0273	.0011	.3792	.1356
19.79	.5491	.0192	-.0085	.5101	.2040
21.80	.6234	.0162	-.0127	.5728	.2465

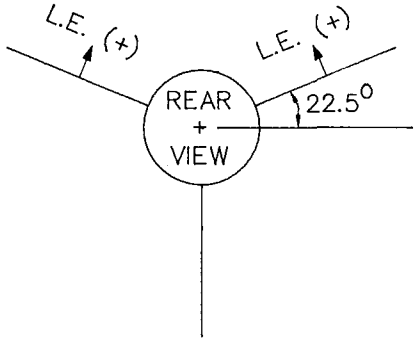


TABLE 3.- Continued

(c) M = 2.36

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.09	-.0070	.0252	-.0128	-.0061	.0255
-1.00	.0270	.0264	-.0158	.0274	.0259
-.05	.0492	.0271	-.0178	.0492	.0270
.94	.0792	.0283	-.0205	.0787	.0296
1.94	.1015	.0292	-.0225	.1005	.0326
4.03	.1631	.0309	-.0267	.1606	.0423
5.99	.2101	.0315	-.0276	.2057	.0533
8.00	.2468	.0304	-.0263	.2402	.0645
9.98	.2887	.0273	-.0246	.2796	.0769
11.99	.3398	.0261	-.0249	.3270	.0961
16.00	.4669	.0285	-.0308	.4409	.1560
19.97	.5971	.0320	-.0377	.5502	.2340
21.99	.6676	.0344	-.0416	.6062	.2818

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.17	-.1195	.0317	.0258	-.1182	.0362
-1.03	-.0801	.0304	.0223	-.0796	.0318
-.05	-.0562	.0293	.0200	-.0562	.0294
.95	-.0331	.0286	.0178	-.0336	.0280
1.95	-.0010	.0274	.0149	-.0019	.0274
4.00	.0524	.0261	.0110	.0505	.0297
6.01	.1037	.0256	.0086	.1004	.0363
7.99	.1565	.0247	.0067	.1516	.0463
9.96	.2095	.0228	.0034	.2024	.0586
11.98	.2753	.0202	-.0012	.2651	.0769
15.98	.4143	.0156	-.0106	.3940	.1291
19.98	.5497	.0128	-.0183	.5122	.1999
21.98	.6154	.0118	-.0218	.5662	.2413

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.01	-.2144	.1162	.0647	-.2102	.1237
-.99	-.1834	.1135	.0618	-.1814	.1166
-.01	-.1610	.1111	.0598	-.1610	.1112
.96	-.1400	.1088	.0578	-.1418	.1064
1.99	-.1107	.1064	.0550	-.1144	.1025
3.97	-.0550	.1022	.0506	-.0620	.0981
5.97	-.0058	.0978	.0469	-.0160	.0967
7.99	.0747	.0832	.0375	.0624	.0928
10.03	.1535	.0705	.0281	.1389	.0961
12.00	.2174	.0612	.0212	.1999	.1050
15.98	.3715	.0412	.0062	.3458	.1419
19.98	.5118	.0317	-.0027	.4702	.2047
21.99	.5810	.0287	-.0059	.5279	.2442

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.01	-.0525	.0187	.0047	-.0518	.0205
-1.01	-.0246	.0187	.0022	-.0243	.0191
0.00	.0045	.0187	-.0002	.0045	.0187
.97	.0244	.0187	-.0020	.0241	.0191
1.96	.0475	.0187	-.0039	.0468	.0203
3.95	.1010	.0187	-.0077	.0995	.0256
5.96	.1536	.0190	-.0100	.1508	.0349
7.98	.2031	.0189	-.0103	.1985	.0469
9.95	.2460	.0180	-.0108	.2392	.0602
11.96	.3059	.0173	-.0131	.2957	.0804
15.98	.4394	.0174	-.0205	.4177	.1376
19.96	.5719	.0179	-.0279	.5314	.2120
21.97	.6400	.0183	-.0313	.5866	.2564

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.02	-.1685	.0646	.0461	-.1661	.0705
-1.06	-.1460	.0631	.0439	-.1449	.0658
.03	-.1083	.0604	.0403	-.1083	.0603
.98	-.0827	.0584	.0379	-.0837	.0570
1.99	-.0595	.0568	.0358	-.0614	.0547
3.97	.0010	.0538	.0314	-.0027	.0538
5.98	.0466	.0519	.0288	.0410	.0565
7.98	.1097	.0464	.0234	.1022	.0612
9.97	.1798	.0394	.0160	.1702	.0700
11.99	.2482	.0337	.0097	.2358	.0845
15.98	.3908	.0226	-.0019	.3694	.1293
19.98	.5246	.0167	-.0097	.4873	.1950
21.98	.5976	.0149	-.0134	.5486	.2374

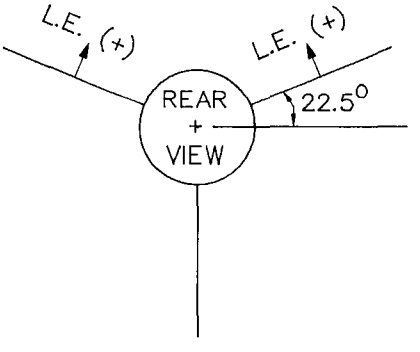


TABLE 3.- Concluded

(d) M = 2.86

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.46	-.0138	.0210	-.0102	-.0129	.0216
-1.48	.0063	.0214	-.0115	.0069	.0212
-.48	.0275	.0219	-.0129	.0277	.0217
.53	.0515	.0225	-.0145	.0513	.0230
1.53	.0722	.0231	-.0159	.0715	.0250
3.53	.1180	.0244	-.0187	.1162	.0316
5.57	.1655	.0256	-.0202	.1623	.0416
7.53	.2027	.0260	-.0192	.1976	.0523
9.52	.2400	.0245	-.0173	.2326	.0638
11.51	.2861	.0239	-.0171	.2755	.0805
15.52	.3928	.0265	-.0201	.3714	.1307
19.52	.5159	.0307	-.0254	.4760	.2013
21.53	.5839	.0334	-.0290	.5309	.2454

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.46	-.0987	.0262	.0196	-.0975	.0304
-1.48	-.0738	.0254	.0176	-.0731	.0273
-.48	-.0505	.0245	.0157	-.0503	.0249
.54	-.0299	.0240	.0141	-.0302	.0237
1.55	-.0039	.0232	.0122	-.0045	.0231
3.55	.0447	.0220	.0090	.0432	.0247
5.52	.0919	.0213	.0061	.0894	.0300
7.51	.1384	.0206	.0045	.1346	.0385
9.52	.1929	.0191	.0017	.1871	.0508
11.53	.2516	.0173	-.0015	.2430	.0673
15.56	.3667	.0160	-.0064	.3490	.1138
19.51	.4847	.0151	-.0111	.4518	.1762
21.54	.5517	.0151	-.0135	.5077	.2166

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.32	-.1951	.1046	.0565	-.1907	.1124
-1.28	-.1635	.1011	.0534	-.1612	.1047
-.30	-.1411	.0980	.0512	-.1406	.0988
.71	-.1191	.0953	.0489	-.1202	.0938
1.71	-.0897	.0927	.0463	-.0924	.0900
3.72	-.0404	.0876	.0421	-.0460	.0848
5.71	.0090	.0820	.0380	.0008	.0825
7.72	.0761	.0683	.0290	.0663	.0779
9.73	.1423	.0562	.0206	.1308	.0795
11.72	.2097	.0445	.0124	.1963	.0861
15.72	.3335	.0337	.0030	.3119	.1228
19.68	.4442	.0295	-.0012	.4083	.1774
21.71	.5147	.0281	-.0034	.4678	.2165

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.48	-.0562	.0155	.0040	-.0555	.0179
-1.49	-.0329	.0155	.0023	-.0324	.0164
-.47	-.0106	.0155	.0008	-.0105	.0156
.55	.0137	.0155	-.0007	.0135	.0156
1.53	.0333	.0154	-.0020	.0328	.0163
3.55	.0806	.0156	-.0049	.0795	.0205
5.54	.1259	.0161	-.0072	.1238	.0282
7.55	.1706	.0169	-.0077	.1669	.0391
9.52	.2139	.0166	-.0079	.2082	.0518
11.51	.2622	.0163	-.0090	.2537	.0683
15.55	.3744	.0175	-.0127	.3560	.1172
19.53	.4978	.0190	-.0179	.4628	.1844
21.54	.5641	.0200	-.0208	.5174	.2257

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.49	-.1484	.0558	.0384	-.1458	.0622
-1.50	-.1256	.0541	.0362	-.1241	.0574
-.49	-.1020	.0522	.0339	-.1015	.0530
.54	-.0727	.0499	.0313	-.0732	.0492
1.51	-.0534	.0486	.0297	-.0546	.0471
3.55	-.0026	.0454	.0258	-.0054	.0451
5.51	.0449	.0429	.0226	.0406	.0470
7.55	.1086	.0371	.0173	.1027	.0510
9.57	.1703	.0311	.0117	.1627	.0590
11.55	.2304	.0258	.0063	.2206	.0714
15.54	.3468	.0212	.0002	.3285	.1133
19.57	.4707	.0185	-.0043	.4373	.1751
21.53	.5304	.0178	-.0063	.4869	.2112

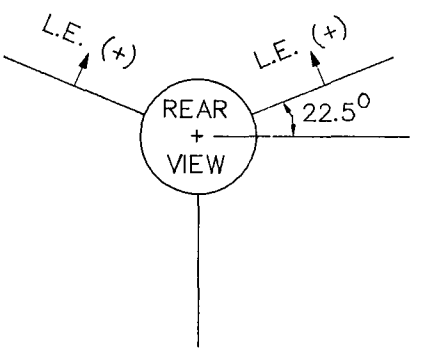


TABLE 4.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 4

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.25	.0169	.0360	-.0233	.0183	.0354
-1.18	.0488	.0370	-.0262	.0496	.0359
-.17	.0773	.0379	-.0290	.0774	.0377
.83	.1066	.0388	-.0320	.1060	.0403
1.85	.1374	.0396	-.0352	.1360	.0440
3.81	.2024	.0413	-.0419	.1993	.0546
5.83	.2768	.0437	-.0500	.2710	.0716
7.82	.3517	.0465	-.0580	.3421	.0939
9.84	.4316	.0491	-.0663	.4168	.1221
11.83	.5111	.0512	-.0743	.4897	.1549
15.84	.6870	.0561	-.0896	.6456	.2415
19.83	.8621	.0606	-.1015	.7904	.3495
21.86	.9538	.0625	-.1072	.8619	.4132

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.20	-.1466	.0395	.0343	-.1450	.0451
-1.19	-.1158	.0387	.0315	-.1149	.0411
-.17	-.0862	.0376	.0286	-.0861	.0379
.83	-.0587	.0364	.0258	-.0592	.0356
1.84	-.0257	.0348	.0224	-.0268	.0340
3.84	.0406	.0322	.0156	.0384	.0348
5.84	.1148	.0291	.0079	.1113	.0407
7.85	.1897	.0258	.0002	.1844	.0515
9.81	.2649	.0233	-.0074	.2570	.0681
11.88	.3467	.0204	-.0153	.3351	.0913
15.83	.5105	.0153	-.0279	.4870	.1540
19.86	.6870	.0096	-.0388	.6429	.2424
21.82	.7691	.0074	-.0438	.7113	.2928

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.29	-.2489	.1328	.0673	-.2433	.1426
-1.34	-.2226	.1317	.0655	-.2195	.1369
-.35	-.1944	.1297	.0634	-.1936	.1309
.72	-.1672	.1275	.0613	-.1688	.1254
1.68	-.1410	.1257	.0596	-.1446	.1215
3.68	-.0810	.1208	.0551	-.0886	.1153
5.72	-.0100	.1139	.0491	-.0213	.1123
7.71	.0628	.1066	.0422	.0479	.1140
9.68	.1369	.1005	.0361	.1180	.1221
11.66	.2114	.0939	.0299	.1880	.1347
15.67	.3715	.0800	.0190	.3361	.1774
19.67	.5408	.0655	.0097	.4872	.2437
21.67	.6227	.0607	.0068	.5563	.2863

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.17	-.0643	.0240	.0064	-.0634	.0264
-1.16	-.0333	.0241	.0035	-.0328	.0248
-.18	-.0054	.0242	.0008	-.0054	.0242
.83	.0230	.0241	-.0022	.0227	.0244
1.82	.0522	.0237	-.0052	.0514	.0254
3.83	.1206	.0235	-.0124	.1187	.0315
5.82	.1938	.0236	-.0203	.1904	.0431
7.82	.2714	.0237	-.0287	.2656	.0604
9.83	.3515	.0236	-.0374	.3423	.0832
11.83	.4344	.0236	-.0454	.4204	.1122
15.83	.6030	.0233	-.0597	.5738	.1869
19.85	.7844	.0227	-.0713	.7301	.2877
21.83	.8716	.0221	-.0777	.8009	.3446

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.32	-.2122	.0814	.0559	-.2088	.0900
-1.36	-.1835	.0803	.0535	-.1815	.0846
-.33	-.1548	.0783	.0510	-.1543	.0792
.69	-.1276	.0765	.0485	-.1286	.0749
1.67	-.0986	.0743	.0459	-.1007	.0714
3.70	-.0311	.0696	.0395	-.0355	.0674
5.69	.0405	.0647	.0324	.0339	.0684
7.68	.1164	.0597	.0249	.1074	.0747
9.67	.1927	.0545	.0176	.1808	.0861
11.69	.2720	.0491	.0103	.2564	.1032
15.66	.4328	.0392	-.0016	.4062	.1545
19.70	.6078	.0281	-.0120	.5628	.2314
21.72	.6925	.0240	-.0159	.6344	.2786

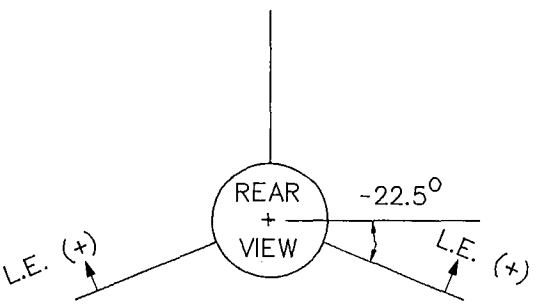


TABLE 4.- Continued

(b) M = 2.16

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.17	-.0014	.0298	-.0162	-.0003	.0299
-1.11	.0299	.0308	-.0190	.0305	.0302
-.14	.0571	.0318	-.0215	.0572	.0317
.92	.0872	.0328	-.0242	.0866	.0342
1.88	.1152	.0336	-.0269	.1140	.0374
3.90	.1785	.0358	-.0331	.1756	.0478
5.86	.2423	.0379	-.0392	.2372	.0625
7.87	.3063	.0401	-.0452	.2980	.0816
9.91	.3747	.0419	-.0508	.3619	.1058
11.90	.4442	.0439	-.0566	.4256	.1346
15.89	.5910	.0481	-.0666	.5553	.2081
19.87	.7461	.0526	-.0786	.6838	.3031
21.89	.8298	.0552	-.0858	.7494	.3606

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.14	-.1150	.0323	.0252	-.1137	.0366
-1.11	-.0862	.0313	.0228	-.0856	.0330
-.13	-.0599	.0302	.0204	-.0598	.0303
.91	-.0306	.0288	.0178	-.0311	.0283
1.88	-.0035	.0275	.0153	-.0044	.0273
3.86	.0563	.0251	.0099	.0544	.0288
5.92	.1214	.0233	.0042	.1184	.0357
7.89	.1818	.0215	-.0010	.1771	.0463
9.86	.2441	.0200	-.0054	.2371	.0615
11.89	.3089	.0188	-.0095	.2984	.0820
15.88	.4455	.0158	-.0164	.4242	.1371
19.87	.5867	.0139	-.0234	.5471	.2125
21.89	.6608	.0126	-.0274	.6084	.2580

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.29	-.2097	.1153	.0555	-.2050	.1236
-1.29	-.1829	.1142	.0539	-.1803	.1183
-.21	-.1555	.1120	.0520	-.1551	.1126
.80	-.1305	.1099	.0502	-.1320	.1081
1.77	-.1050	.1080	.0486	-.1083	.1047
3.76	-.0477	.1026	.0444	-.0544	.0993
5.79	.0141	.0968	.0395	.0042	.0977
7.76	.0761	.0910	.0345	.0632	.1004
9.77	.1415	.0853	.0295	.1249	.1081
11.80	.2048	.0821	.0263	.1837	.1222
15.76	.3359	.0752	.0214	.3028	.1636
19.77	.4680	.0740	.0185	.4154	.2279
21.76	.5359	.0730	.0170	.4707	.2665

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.14	-.0583	.0204	.0049	-.0575	.0225
-1.12	-.0300	.0204	.0026	-.0296	.0209
-.11	-.0022	.0204	.0002	-.0021	.0204
.89	.0250	.0202	-.0021	.0247	.0206
1.89	.0526	.0200	-.0045	.0520	.0217
3.88	.1131	.0197	-.0100	.1115	.0273
5.87	.1762	.0197	-.0159	.1733	.0376
7.88	.2409	.0198	-.0217	.2359	.0526
9.87	.3060	.0200	-.0271	.2981	.0722
11.88	.3730	.0201	-.0321	.3609	.0965
15.88	.5179	.0205	-.0412	.4925	.1614
19.88	.6671	.0209	-.0511	.6203	.2465
21.86	.7442	.0210	-.0569	.6829	.2965

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.27	-.1759	.0698	.0448	-.1730	.0767
-1.27	-.1479	.0684	.0428	-.1464	.0716
-.27	-.1217	.0667	.0406	-.1214	.0673
.77	-.0931	.0645	.0382	-.0939	.0632
1.78	-.0658	.0624	.0358	-.0677	.0603
3.77	-.0048	.0578	.0306	-.0086	.0574
5.78	.0571	.0537	.0252	.0514	.0591
7.81	.1229	.0494	.0196	.1150	.0656
9.80	.1862	.0460	.0149	.1756	.0770
11.75	.2471	.0438	.0115	.2330	.0932
15.78	.3830	.0382	.0060	.3581	.1409
19.73	.5170	.0357	.0017	.4746	.2082
21.81	.5900	.0342	-.0010	.5351	.2510

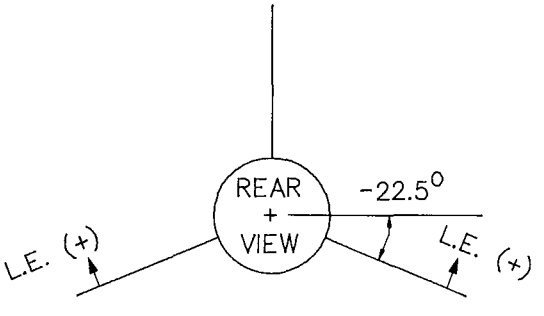


TABLE 4.- Continued

(c) M = 2.36

$\delta_p = 10°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.75	-.0009	.0274	-.0145	-.0001	.0274
-.70	.0327	.0285	-.0174	.0330	.0281
.29	.0551	.0293	-.0196	.0550	.0296
1.32	.0947	.0305	-.0231	.0940	.0327
2.29	.1158	.0314	-.0252	.1144	.0360
4.30	.1735	.0335	-.0305	.1705	.0465
6.30	.2275	.0357	-.0355	.2222	.0604
8.28	.2864	.0378	-.0409	.2780	.0786
10.30	.3544	.0401	-.0464	.3416	.1028
12.30	.4200	.0421	-.0515	.4013	.1306
16.25	.5549	.0464	-.0613	.5197	.1998
20.30	.7132	.0517	-.0744	.6509	.2960
22.31	.7904	.0544	-.0811	.7106	.3503

$\delta_p = -10°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.73	-.1040	.0287	.0224	-.1031	.0319
-.73	-.0740	.0279	.0199	-.0737	.0288
.27	-.0473	.0270	.0176	-.0474	.0267
1.29	-.0211	.0258	.0152	-.0217	.0253
2.29	.0076	.0247	.0127	.0067	.0250
4.30	.0655	.0230	.0078	.0636	.0279
6.29	.1221	.0217	.0034	.1190	.0349
8.27	.1730	.0205	-.0003	.1682	.0452
10.30	.2350	.0192	-.0039	.2278	.0609
12.28	.2892	.0180	-.0071	.2788	.0792
16.28	.4206	.0160	-.0135	.3993	.1333
20.28	.5490	.0145	-.0195	.5099	.2038
22.29	.6243	.0135	-.0235	.5726	.2493

$\delta_p = -30°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.06	-.1976	.1098	.0525	-.1935	.1168
-.87	-.1642	.1084	.0507	-.1625	.1109
0.00	-.1413	.1069	.0493	-.1414	.1069
1.04	-.1176	.1053	.0477	-.1195	.1031
2.03	-.0942	.1026	.0459	-.0978	.0992
4.03	-.0407	.0977	.0418	-.0475	.0945
5.99	.0245	.0919	.0367	.0148	.0939
8.00	.0778	.0873	.0326	.0649	.0972
10.02	.1441	.0833	.0286	.1274	.1071
12.02	.1963	.0815	.0268	.1750	.1206
16.05	.3205	.0789	.0233	.2862	.1644
20.05	.4485	.0791	.0206	.3942	.2281
22.02	.5071	.0791	.0193	.4404	.2635

$\delta_p = 0°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.71	-.0445	.0187	.0039	-.0439	.0201
-.70	-.0158	.0187	.0016	-.0156	.0189
.29	.0068	.0187	-.0004	.0067	.0187
1.29	.0298	.0186	-.0025	.0293	.0193
2.33	.0645	.0186	-.0055	.0636	.0212
4.31	.1173	.0187	-.0100	.1155	.0274
6.26	.1673	.0188	-.0141	.1643	.0369
8.30	.2341	.0189	-.0199	.2289	.0525
10.32	.2944	.0190	-.0243	.2862	.0715
12.30	.3535	.0191	-.0282	.3413	.0940
16.29	.4910	.0198	-.0374	.4657	.1567
20.28	.6315	.0203	-.0469	.5853	.2379
22.29	.7089	.0208	-.0528	.6480	.2882

$\delta_p = -20°$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.01	-.1570	.0647	.0414	-.1546	.0701
-.99	-.1270	.0627	.0390	-.1259	.0649
0.00	-.1051	.0611	.0371	-.1051	.0611
1.03	-.0761	.0583	.0346	-.0771	.0569
2.08	-.0431	.0565	.0317	-.0451	.0549
4.02	.0063	.0533	.0275	.0026	.0537
5.99	.0670	.0498	.0225	.0614	.0565
8.00	.1290	.0468	.0179	.1213	.0643
10.04	.1864	.0445	.0147	.1758	.0763
12.00	.2476	.0426	.0121	.2333	.0931
15.99	.3661	.0398	.0080	.3410	.1391
20.01	.4985	.0380	.0036	.4554	.2063
22.02	.5653	.0371	.0013	.5102	.2463

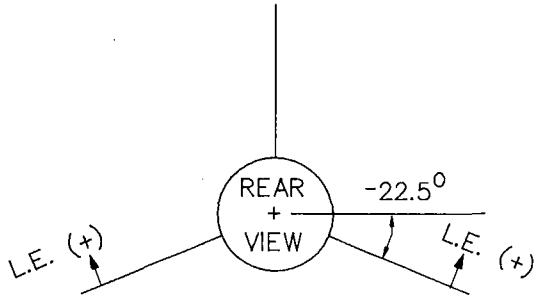


TABLE 4.- Concluded

(d) M = 2.86

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.09	-.0078	.0234	-.0113	-.0069	.0237
-1.04	.0176	.0241	-.0131	.0181	.0238
-.04	.0431	.0248	-.0150	.0431	.0247
.99	.0671	.0255	-.0169	.0667	.0266
1.98	.0908	.0263	-.0187	.0898	.0294
3.95	.1410	.0283	-.0228	.1387	.0379
5.95	.1872	.0304	-.0264	.1830	.0496
7.97	.2436	.0329	-.0307	.2367	.0664
9.96	.3034	.0355	-.0350	.2927	.0875
11.97	.3602	.0380	-.0387	.3445	.1119
15.99	.4851	.0436	-.0477	.4544	.1756
19.97	.6287	.0502	-.0593	.5738	.2619
21.96	.7080	.0541	-.0666	.6365	.3149

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.05	-.0836	.0230	.0169	-.0828	.0260
-1.05	-.0647	.0225	.0155	-.0642	.0237
-.05	-.0434	.0219	.0140	-.0434	.0219
.94	-.0222	.0215	.0126	-.0226	.0211
1.95	-.0013	.0209	.0113	-.0020	.0209
3.97	.0484	.0201	.0084	.0469	.0234
5.93	.0898	.0201	.0064	.0872	.0292
7.99	.1408	.0198	.0044	.1367	.0392
9.95	.1872	.0195	.0030	.1810	.0516
11.95	.2378	.0192	.0018	.2287	.0680
15.97	.3465	.0189	-.0011	.3279	.1135
19.97	.4643	.0190	-.0051	.4299	.1765
21.97	.5302	.0190	-.0077	.4846	.2160

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.03	-.1757	.0996	.0467	-.1721	.1058
-1.01	-.1504	.0975	.0451	-.1487	.1002
.01	-.1283	.0957	.0437	-.1283	.0957
1.03	-.1080	.0937	.0422	-.1096	.0917
1.99	-.0826	.0917	.0404	-.0858	.0888
4.05	-.0346	.0879	.0370	-.0408	.0853
6.03	.0154	.0855	.0341	.0063	.0867
8.03	.0630	.0834	.0317	.0508	.0914
10.09	.1125	.0833	.0305	.0962	.1017
12.00	.1569	.0836	.0299	.1361	.1144
16.00	.2549	.0880	.0301	.2208	.1549
20.00	.3588	.0928	.0305	.3054	.2100
22.04	.4171	.0953	.0307	.3509	.2449

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.05	-.0455	.0156	.0031	-.0449	.0172
-1.02	-.0236	.0156	.0016	-.0234	.0160
0.00	.0020	.0155	0.0000	.0020	.0155
.96	.0210	.0156	-.0012	.0208	.0159
1.96	.0425	.0156	-.0026	.0420	.0171
3.99	.0902	.0159	-.0055	.0889	.0221
5.96	.1366	.0166	-.0083	.1342	.0307
7.99	.1870	.0172	-.0110	.1828	.0430
9.96	.2367	.0176	-.0135	.2300	.0583
11.95	.2907	.0181	-.0158	.2807	.0779
15.96	.4067	.0194	-.0218	.3857	.1305
19.96	.5385	.0211	-.0297	.4989	.2037
21.97	.6091	.0220	-.0344	.5566	.2483

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.02	-.1334	.0548	.0338	-.1314	.0595
-1.01	-.1089	.0534	.0321	-.1080	.0554
-.01	-.0865	.0517	.0304	-.0865	.0517
.99	-.0629	.0505	.0288	-.0638	.0494
2.01	-.0413	.0492	.0271	-.0430	.0477
3.98	.0053	.0473	.0241	.0021	.0476
6.03	.0592	.0458	.0211	.0540	.0518
8.04	.1028	.0448	.0191	.0956	.0587
10.01	.1507	.0442	.0177	.1407	.0697
12.06	.2027	.0441	.0167	.1890	.0854
16.00	.3045	.0448	.0152	.2803	.1270
19.98	.4110	.0460	.0138	.3705	.1837
22.04	.4747	.0464	.0125	.4226	.2212

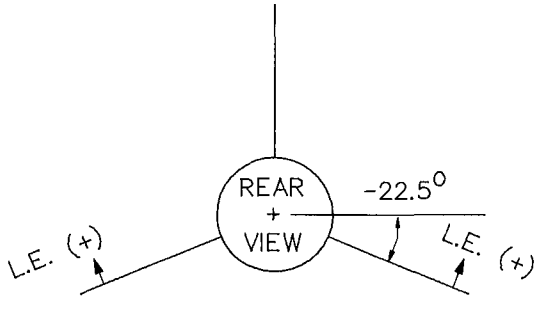


TABLE 5.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 5

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.16	.0108	.0374	-.0198	.0122	.0370
-1.13	.0428	.0389	-.0230	.0436	.0380
-.14	.0723	.0402	-.0260	.0724	.0400
.87	.1008	.0413	-.0289	.1002	.0428
1.87	.1316	.0421	-.0316	.1301	.0464
3.90	.1942	.0436	-.0364	.1908	.0567
5.84	.2488	.0439	-.0384	.2431	.0690
7.89	.2998	.0435	-.0372	.2910	.0842
9.89	.3432	.0403	-.0333	.3312	.0987
11.87	.3903	.0354	-.0302	.3746	.1150
15.89	.5134	.0312	-.0288	.4853	.1705
19.91	.6751	.0330	-.0355	.6236	.2609
21.94	.7642	.0346	-.0404	.6960	.3176

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.12	-.1469	.0429	.0362	-.1452	.0483
-1.15	-.1163	.0420	.0330	-.1155	.0443
-.14	-.0868	.0410	.0299	-.0867	.0412
.88	-.0572	.0399	.0267	-.0578	.0390
1.88	-.0268	.0387	.0236	-.0281	.0378
3.89	.0370	.0370	.0181	.0345	.0394
5.90	.0979	.0359	.0145	.0936	.0458
7.90	.1518	.0368	.0144	.1453	.0573
9.87	.2018	.0378	.0162	.1924	.0718
11.91	.2655	.0365	.0145	.2523	.0905
15.89	.4219	.0307	.0040	.3974	.1450
19.89	.5954	.0243	-.0070	.5516	.2254
21.93	.6851	.0211	-.0127	.6277	.2754

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	-.2665	.1414	.0814	-.2611	.1512
-1.15	-.2363	.1388	.0784	-.2334	.1436
-.13	-.2070	.1364	.0756	-.2067	.1368
.87	-.1791	.1340	.0729	-.1811	.1313
1.88	-.1496	.1316	.0702	-.1538	.1266
3.89	-.0881	.1265	.0649	-.0965	.1202
5.89	-.0209	.1194	.0592	-.0331	.1166
7.88	.0309	.1198	.0592	.0142	.1229
9.88	.0875	.1223	.0585	.0652	.1355
11.89	.1741	.1100	.0487	.1477	.1435
15.90	.3510	.0852	.0315	.3142	.1781
19.87	.5308	.0661	.0184	.4767	.2426
21.86	.6188	.0586	.0130	.5525	.2848

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	-.0649	.0258	.0067	-.0639	.0282
-1.15	-.0322	.0260	.0034	-.0317	.0266
-.15	-.0041	.0261	.0004	-.0040	.0261
.88	.0257	.0261	-.0026	.0252	.0265
1.88	.0562	.0261	-.0055	.0553	.0279
3.87	.1172	.0262	-.0106	.1152	.0340
5.89	.1777	.0262	-.0139	.1741	.0442
7.89	.2302	.0266	-.0139	.2244	.0579
9.88	.2765	.0261	-.0106	.2679	.0732
11.88	.3279	.0247	-.0089	.3158	.0916
15.87	.4654	.0225	-.0125	.4415	.1490
19.87	.6342	.0214	-.0216	.5892	.2357
21.86	.7220	.0211	-.0269	.6622	.2884

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	-.2252	.0862	.0650	-.2218	.0945
-1.16	-.1942	.0843	.0617	-.1925	.0883
-.12	-.1634	.0823	.0585	-.1632	.0827
.87	-.1363	.0806	.0557	-.1375	.0785
1.88	-.1044	.0784	.0526	-.1069	.0750
3.88	-.0416	.0746	.0467	-.0465	.0716
5.88	.0225	.0720	.0421	.0150	.0739
7.89	.0810	.0721	.0409	.0704	.0826
9.88	.1302	.0742	.0425	.1155	.0954
11.89	.2077	.0681	.0359	.1893	.1095
15.87	.3803	.0540	.0198	.3510	.1559
19.85	.5585	.0401	.0069	.5117	.2274
21.87	.6494	.0343	.0010	.5899	.2738

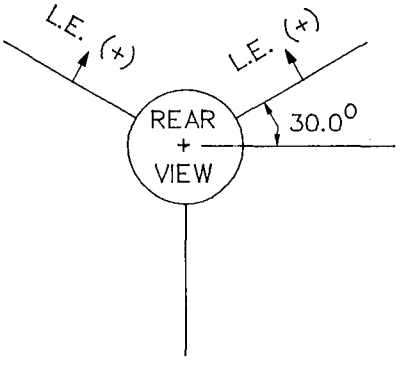


TABLE 5.- Continued

(b) M = 2.16

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.33	-.0080	.0304	-.0142	-.0068	.0307
-1.28	.0220	.0315	-.0167	.0227	.0310
-.31	.0478	.0324	-.0188	.0480	.0321
.70	.0747	.0333	-.0211	.0743	.0342
1.67	.1002	.0341	-.0231	.0991	.0370
3.71	.1579	.0356	-.0272	.1553	.0458
5.69	.2122	.0369	-.0301	.2075	.0577
7.69	.2605	.0369	-.0299	.2532	.0714
9.70	.3011	.0342	-.0264	.2910	.0844
11.73	.3479	.0309	-.0240	.3344	.1010
15.75	.4656	.0288	-.0236	.4403	.1541
19.74	.6050	.0314	-.0293	.5588	.2339
21.71	.6780	.0330	-.0329	.6177	.2815

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.36	-.1212	.0367	.0264	-.1196	.0416
-1.33	-.0912	.0358	.0238	-.0903	.0379
-.29	-.0635	.0349	.0213	-.0633	.0352
.71	-.0364	.0338	.0188	-.0369	.0334
1.68	-.0093	.0329	.0165	-.0103	.0326
3.70	.0493	.0310	.0119	.0472	.0341
5.71	.1061	.0298	.0083	.1027	.0402
7.70	.1589	.0297	.0067	.1535	.0507
9.71	.2095	.0294	.0064	.2015	.0643
11.69	.2729	.0274	.0032	.2617	.0821
15.71	.4148	.0224	-.0046	.3933	.1339
19.72	.5606	.0192	-.0124	.5212	.2072
21.70	.6332	.0178	-.0162	.5818	.2507

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.30	-.2327	.1264	.0690	-.2274	.1356
-1.32	-.2040	.1239	.0663	-.2011	.1286
-.30	-.1773	.1216	.0638	-.1766	.1226
.70	-.1506	.1190	.0614	-.1521	.1172
1.70	-.1217	.1159	.0587	-.1251	.1123
3.69	-.0606	.1083	.0525	-.0674	.1042
5.71	.0036	.1003	.0464	-.0064	.1001
7.70	.0534	.0994	.0459	.0396	.1057
9.71	.1175	.0924	.0414	.1002	.1109
11.70	.1965	.0786	.0315	.1764	.1168
15.70	.3579	.0539	.0156	.3299	.1487
19.71	.5116	.0411	.0046	.4677	.2113
21.72	.5841	.0369	.0008	.5290	.2504

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.30	-.0625	.0228	.0052	-.0616	.0253
-1.31	-.0344	.0228	.0028	-.0338	.0236
-.30	-.0085	.0229	.0007	-.0084	.0229
.72	.0186	.0230	-.0015	.0183	.0232
1.68	.0446	.0229	-.0036	.0439	.0242
3.72	.1004	.0226	-.0076	.0987	.0291
5.68	.1556	.0226	-.0108	.1526	.0379
7.68	.2083	.0232	-.0124	.2033	.0508
9.69	.2544	.0229	-.0109	.2469	.0654
11.68	.3067	.0216	-.0106	.2960	.0833
15.71	.4346	.0207	-.0135	.4128	.1376
19.69	.5755	.0207	-.0202	.5349	.2133
21.68	.6505	.0208	-.0238	.5967	.2597

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.30	-.1811	.0721	.0488	-.1781	.0793
-1.30	-.1524	.0704	.0462	-.1508	.0738
-.31	-.1259	.0688	.0438	-.1255	.0695
.71	-.0991	.0669	.0414	-.0999	.0657
1.72	-.0705	.0650	.0390	-.0724	.0629
3.70	-.0134	.0615	.0343	-.0174	.0606
5.72	.0459	.0583	.0300	.0398	.0626
7.70	.1011	.0563	.0274	.0926	.0693
9.70	.1598	.0528	.0244	.1486	.0790
11.72	.2315	.0468	.0181	.2172	.0928
15.72	.3852	.0332	.0056	.3618	.1364
19.72	.5314	.0263	-.0031	.4914	.2040
21.70	.6040	.0234	-.0068	.5526	.2451

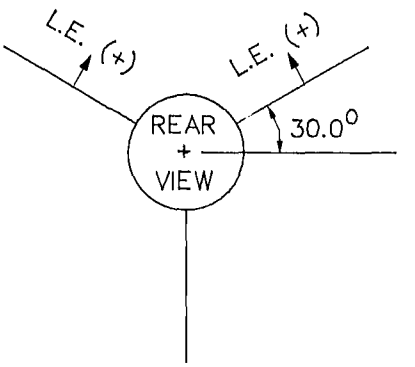


TABLE 5.- Continued

(c) M = 2.36

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.99	-.0040	.0293	-.0134	-.0030	.0294
-1.00	.0197	.0300	-.0151	.0202	.0296
.02	.0484	.0306	-.0173	.0484	.0306
1.01	.0735	.0313	-.0192	.0730	.0326
2.07	.1018	.0323	-.0213	.1005	.0360
4.01	.1546	.0334	-.0250	.1519	.0441
6.02	.2025	.0343	-.0275	.1978	.0554
8.04	.2522	.0345	-.0272	.2449	.0694
10.00	.2899	.0323	-.0246	.2799	.0822
11.98	.3344	.0297	-.0224	.3209	.0984
16.03	.4497	.0284	-.0232	.4243	.1515
20.02	.5842	.0310	-.0288	.5383	.2291
22.07	.6596	.0330	-.0326	.5989	.2784
$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.02	-.1094	.0342	.0235	-.1081	.0380
-1.04	-.0800	.0335	.0208	-.0794	.0350
-.02	-.0555	.0326	.0188	-.0555	.0326
1.01	-.0311	.0318	.0167	-.0317	.0313
2.00	.0008	.0307	.0143	-.0003	.0307
4.01	.0528	.0291	.0102	.0507	.0328
6.03	.1083	.0279	.0065	.1048	.0391
7.99	.1612	.0275	.0044	.1559	.0496
9.97	.2090	.0270	.0035	.2012	.0628
12.07	.2772	.0248	0.0000	.2659	.0822
16.01	.4040	.0209	-.0071	.3826	.1315
20.02	.5413	.0187	-.0139	.5022	.2029
22.08	.6098	.0176	-.0178	.5584	.2455
$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.00	-.2214	.1207	.0647	-.2170	.1284
-1.00	-.1874	.1180	.0619	-.1853	.1213
.01	-.1629	.1151	.0594	-.1629	.1150
1.04	-.1368	.1126	.0570	-.1388	.1101
2.02	-.1070	.1096	.0543	-.1108	.1058
4.03	-.0518	.1032	.0488	-.0589	.0993
6.00	.0094	.0953	.0429	-.0006	.0957
8.00	.0646	.0912	.0401	.0513	.0992
10.03	.1299	.0813	.0342	.1138	.1027
11.98	.2044	.0693	.0256	.1855	.1103
16.01	.3636	.0451	.0086	.3371	.1436
20.03	.5052	.0348	-.0006	.4627	.2057
22.03	.5805	.0310	-.0046	.5265	.2465

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.01	-.0550	.0219	.0041	-.0542	.0238
-1.02	-.0297	.0217	.0022	-.0293	.0223
0.00	.0004	.0218	.0001	.0004	.0218
1.01	.0221	.0216	-.0017	.0217	.0220
2.00	.0528	.0218	-.0040	.0520	.0236
4.01	.1023	.0217	-.0077	.1006	.0288
6.00	.1573	.0217	-.0109	.1542	.0380
8.00	.2077	.0223	-.0123	.2026	.0509
10.00	.2519	.0221	-.0113	.2442	.0655
11.98	.3029	.0211	-.0114	.2919	.0835
16.02	.4323	.0203	-.0154	.4099	.1388
20.02	.5691	.0209	-.0218	.5275	.2145
22.05	.6394	.0213	-.0254	.5846	.2598
$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.98	-.1621	.0673	.0439	-.1597	.0729
-1.00	-.1309	.0655	.0411	-.1298	.0678
0.00	-.1079	.0640	.0391	-.1079	.0640
1.05	-.0811	.0619	.0367	-.0822	.0604
2.01	-.0592	.0606	.0348	-.0613	.0585
3.98	-.0049	.0573	.0304	-.0089	.0568
5.99	.0527	.0541	.0260	.0468	.0593
7.99	.1095	.0512	.0225	.1013	.0659
9.98	.1628	.0473	.0191	.1521	.0748
12.00	.2407	.0403	.0125	.2270	.0895
16.01	.3872	.0288	.0002	.3642	.1345
20.05	.5293	.0230	-.0076	.4893	.2030
22.04	.5998	.0208	-.0112	.5482	.2443

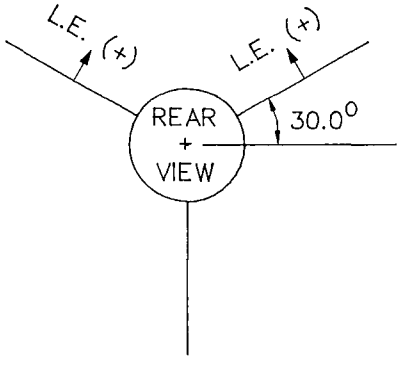


TABLE 5.- Concluded

(d) M = 2.86

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.0103	.0255	-.0108	-.0093	.0259
-1.28	.0094	.0259	-.0118	.0100	.0257
-.17	.0327	.0260	-.0130	.0328	.0259
.80	.0554	.0265	-.0142	.0550	.0273
1.76	.0721	.0270	-.0152	.0713	.0292
3.75	.1173	.0276	-.0177	.1152	.0352
5.79	.1656	.0287	-.0202	.1619	.0453
7.81	.2112	.0292	-.0203	.2052	.0576
9.72	.2492	.0283	-.0184	.2409	.0700
11.77	.2914	.0272	-.0172	.2797	.0860
15.76	.3899	.0274	-.0180	.3678	.1323
19.83	.5110	.0300	-.0215	.4705	.2016
21.76	.5704	.0320	-.0235	.5179	.2412

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.25	-.0978	.0293	.0190	-.0966	.0331
-1.24	-.0721	.0284	.0171	-.0715	.0299
-.27	-.0503	.0277	.0155	-.0502	.0280
.74	-.0284	.0271	.0139	-.0288	.0267
1.81	.0026	.0262	.0118	.0018	.0263
3.81	.0470	.0251	.0089	.0452	.0282
5.76	.0942	.0240	.0061	.0913	.0334
7.76	.1416	.0230	.0037	.1372	.0419
9.79	.1920	.0223	.0015	.1855	.0546
11.76	.2470	.0204	-.0014	.2376	.0703
15.79	.3595	.0194	-.0060	.3406	.1164
19.80	.4745	.0190	-.0097	.4401	.1786
21.83	.5384	.0190	-.0120	.4927	.2178

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.1941	.1084	.0570	-.1898	.1159
-1.21	-.1670	.1055	.0545	-.1647	.1090
-.21	-.1392	.1021	.0520	-.1388	.1026
.79	-.1176	.0995	.0498	-.1190	.0979
1.81	-.0904	.0962	.0472	-.0934	.0933
3.77	-.0403	.0902	.0422	-.0462	.0873
5.80	.0153	.0825	.0370	.0069	.0836
7.78	.0647	.0758	.0332	.0539	.0839
9.79	.1303	.0633	.0251	.1176	.0845
11.77	.2043	.0486	.0159	.1901	.0892
15.79	.3326	.0348	.0043	.3106	.1239
19.79	.4514	.0294	-.0007	.4148	.1805
21.80	.5138	.0280	-.0027	.4667	.2168

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.24	-.0499	.0191	.0031	-.0491	.0210
-1.22	-.0268	.0190	.0018	-.0264	.0196
-.24	-.0072	.0188	.0006	-.0071	.0188
.78	.0162	.0188	-.0007	.0160	.0190
1.77	.0394	.0189	-.0020	.0388	.0201
3.78	.0832	.0188	-.0043	.0818	.0242
5.79	.1304	.0188	-.0071	.1278	.0319
7.77	.1731	.0191	-.0087	.1689	.0423
9.77	.2205	.0196	-.0088	.2140	.0567
11.77	.2677	.0195	-.0094	.2581	.0737
15.78	.3759	.0200	-.0120	.3563	.1214
19.78	.4892	.0214	-.0150	.4531	.1857
21.76	.5504	.0222	-.0172	.5030	.2247

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.23	-.1453	.0590	.0376	-.1429	.0646
-1.22	-.1185	.0571	.0351	-.1172	.0596
-.22	-.0943	.0549	.0330	-.0941	.0553
.76	-.0729	.0535	.0310	-.0736	.0525
1.77	-.0476	.0517	.0288	-.0492	.0502
3.78	.0043	.0484	.0249	.0011	.0485
5.79	.0550	.0452	.0213	.0501	.0505
7.77	.1021	.0416	.0178	.0956	.0550
9.79	.1615	.0361	.0129	.1530	.0630
11.78	.2225	.0300	.0074	.2117	.0748
15.80	.3429	.0244	-.0004	.3233	.1168
19.77	.4602	.0218	-.0047	.4258	.1761
21.76	.5209	.0211	-.0066	.4760	.2127

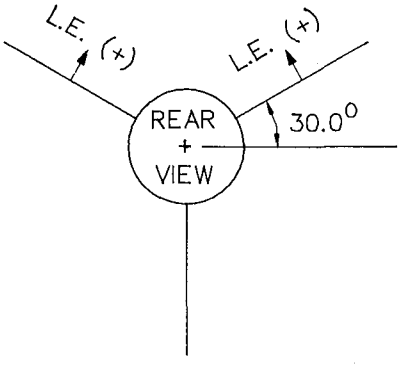


TABLE 6.- LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF MODEL 6

(a) M = 1.70

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.35	.0098	.0381	-.0216	.0113	.0376
-1.29	.0436	.0392	-.0249	.0445	.0382
-.32	.0729	.0403	-.0280	.0731	.0398
.76	.1059	.0414	-.0315	.1053	.0428
1.73	.1350	.0422	-.0347	.1337	.0463
3.71	.2008	.0441	-.0416	.1975	.0570
5.73	.2721	.0463	-.0491	.2661	.0733
7.77	.3502	.0490	-.0573	.3404	.0959
9.73	.4266	.0512	-.0652	.4118	.1226
11.72	.5063	.0534	-.0729	.4849	.1552
15.76	.6803	.0588	-.0887	.6388	.2414
19.73	.8565	.0637	-.1008	.7847	.3492
21.79	.9460	.0653	-.1059	.8541	.4119

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.31	-.1425	.0423	.0327	-.1407	.0480
-1.31	-.1138	.0417	.0302	-.1128	.0442
-.31	-.0841	.0406	.0273	-.0839	.0410
.77	-.0527	.0391	.0242	-.0532	.0384
1.74	-.0213	.0377	.0210	-.0224	.0371
3.76	.0442	.0348	.0145	.0419	.0376
5.73	.1135	.0327	.0076	.1096	.0439
7.71	.1879	.0298	.0005	.1822	.0547
9.72	.2638	.0268	-.0068	.2555	.0709
11.75	.3434	.0241	-.0137	.3313	.0936
15.77	.5049	.0195	-.0252	.4806	.1561
19.76	.6736	.0146	-.0351	.6291	.2414
21.73	.7581	.0125	-.0391	.6995	.2923

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.29	-.2352	.1328	.0618	-.2297	.1421
-1.27	-.2079	.1318	.0601	-.2049	.1364
-.28	-.1808	.1300	.0581	-.1802	.1309
.71	-.1558	.1280	.0563	-.1573	.1260
1.72	-.1274	.1255	.0543	-.1311	.1216
3.72	-.0680	.1208	.0500	-.0757	.1161
5.73	-.0017	.1149	.0447	-.0132	.1142
7.71	.0683	.1092	.0392	.0530	.1174
9.73	.1413	.1034	.0336	.1218	.1258
11.72	.2174	.0972	.0278	.1932	.1393
15.71	.3689	.0867	.0195	.3317	.1833
19.72	.5311	.0753	.0129	.4745	.2501
21.76	.6128	.0716	.0107	.5425	.2937

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.30	-.0695	.0264	.0071	-.0684	.0292
-1.29	-.0367	.0264	.0040	-.0361	.0272
-.26	-.0080	.0263	.0011	-.0079	.0263
.73	.0201	.0262	-.0018	.0198	.0265
1.74	.0521	.0258	-.0051	.0513	.0274
3.74	.1188	.0258	-.0122	.1169	.0335
5.74	.1909	.0258	-.0196	.1874	.0447
7.74	.2649	.0260	-.0273	.2590	.0614
9.74	.3441	.0261	-.0350	.3348	.0840
11.75	.4221	.0260	-.0422	.4080	.1114
15.73	.5876	.0256	-.0556	.5586	.1840
19.73	.7642	.0250	-.0677	.7109	.2816
21.76	.8556	.0243	-.0737	.7857	.3397

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.28	-.2019	.0808	.0520	-.1985	.0888
-1.27	-.1725	.0795	.0497	-.1707	.0834
-.27	-.1432	.0777	.0471	-.1428	.0784
.72	-.1183	.0760	.0450	-.1192	.0746
1.73	-.0884	.0738	.0424	-.0906	.0711
3.72	-.0246	.0694	.0366	-.0290	.0677
5.72	.0453	.0650	.0302	.0386	.0692
7.75	.1187	.0604	.0237	.1095	.0759
9.75	.1957	.0557	.0168	.1835	.0880
11.73	.2709	.0512	.0105	.2549	.1053
15.72	.4244	.0431	.0009	.3968	.1564
19.72	.5906	.0343	-.0069	.5444	.2316
21.74	.6748	.0310	-.0100	.6154	.2787

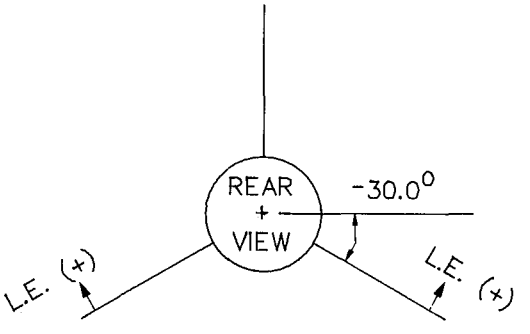


TABLE 6.- Continued

(b) M = 2.16

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.13	.0063	.0330	-.0169	.0075	.0328
-1.17	.0331	.0339	-.0192	.0338	.0332
-.14	.0616	.0350	-.0218	.0617	.0348
.87	.0879	.0358	-.0241	.0874	.0372
1.86	.1167	.0367	-.0268	.1155	.0404
3.90	.1775	.0387	-.0321	.1745	.0507
5.89	.2392	.0409	-.0376	.2338	.0652
7.89	.3024	.0430	-.0431	.2937	.0841
9.90	.3684	.0449	-.0484	.3551	.1076
11.87	.4363	.0468	-.0537	.4173	.1356
15.89	.5829	.0513	-.0638	.5466	.2090
19.90	.7400	.0559	-.0757	.6768	.3045
21.85	.8219	.0585	-.0828	.7411	.3601
$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.15	-.1084	.0345	.0232	-.1071	.0386
-1.18	-.0813	.0337	.0211	-.0806	.0354
-.11	-.0535	.0328	.0188	-.0534	.0329
.86	-.0279	.0318	.0167	-.0284	.0313
1.91	.0012	.0307	.0143	.0002	.0307
3.88	.0570	.0292	.0100	.0549	.0330
5.87	.1174	.0277	.0054	.1140	.0396
7.86	.1766	.0263	.0012	.1714	.0502
9.88	.2390	.0249	-.0027	.2312	.0655
11.84	.3003	.0237	-.0059	.2890	.0848
15.88	.4362	.0211	-.0113	.4138	.1396
19.90	.5782	.0189	-.0175	.5372	.2146
21.88	.6502	.0177	-.0212	.5967	.2587
$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.15	-.1995	.1172	.0516	-.1949	.1246
-1.14	-.1731	.1159	.0500	-.1707	.1193
-.14	-.1485	.1143	.0485	-.1482	.1146
.86	-.1237	.1125	.0471	-.1254	.1106
1.86	-.0976	.1101	.0454	-.1011	.1069
3.86	-.0408	.1051	.0413	-.0477	.1021
5.86	.0168	.1005	.0374	.0064	.1017
7.85	.0769	.0962	.0333	.0630	.1058
9.86	.1373	.0927	.0298	.1194	.1149
11.86	.1987	.0907	.0274	.1758	.1297
15.87	.3254	.0867	.0247	.2893	.1724
19.86	.4549	.0862	.0222	.3985	.2357
21.86	.5210	.0857	.0209	.4516	.2735

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.14	-.0582	.0229	.0048	-.0573	.0250
-1.15	-.0305	.0229	.0027	-.0301	.0236
-.14	-.0039	.0229	.0005	-.0038	.0229
.86	.0218	.0229	-.0016	.0215	.0232
1.85	.0487	.0228	-.0039	.0480	.0243
3.86	.1075	.0227	-.0086	.1058	.0299
5.85	.1658	.0228	-.0134	.1626	.0396
7.87	.2293	.0230	-.0184	.2239	.0542
9.87	.2923	.0231	-.0228	.2840	.0729
11.87	.3579	.0231	-.0273	.3455	.0962
15.86	.4991	.0235	-.0352	.4737	.1590
19.86	.6477	.0240	-.0444	.6010	.2426
21.87	.7258	.0242	-.0495	.6646	.2929
$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.16	-.1647	.0686	.0410	-.1620	.0748
-1.15	-.1367	.0672	.0390	-.1353	.0700
-.14	-.1105	.0656	.0371	-.1103	.0658
.85	-.0855	.0638	.0350	-.0865	.0625
1.86	-.0577	.0618	.0328	-.0597	.0599
3.86	-.0008	.0586	.0286	-.0048	.0585
5.87	.0589	.0556	.0243	.0529	.0614
7.85	.1181	.0528	.0202	.1098	.0684
9.86	.1793	.0504	.0166	.1680	.0804
11.85	.2410	.0488	.0139	.2258	.0973
15.86	.3714	.0447	.0102	.3451	.1445
19.86	.5038	.0425	.0064	.4594	.2111
21.87	.5742	.0412	.0040	.5175	.2521

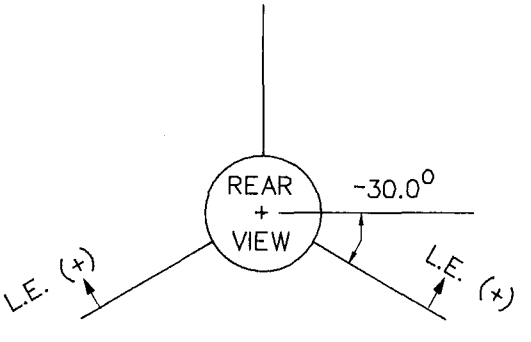


TABLE 6.- Continued

(c) M = 2.36

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.78	.0028	.0311	-.0144	.0037	.0310
-.83	.0287	.0319	-.0165	.0291	.0314
.26	.0598	.0329	-.0191	.0597	.0331
1.21	.0811	.0336	-.0210	.0804	.0353
2.30	.1208	.0348	-.0243	.1193	.0396
4.23	.1626	.0362	-.0281	.1595	.0481
6.25	.2268	.0387	-.0336	.2212	.0632
8.25	.2890	.0413	-.0391	.2800	.0824
10.26	.3519	.0436	-.0441	.3386	.1056
12.28	.4246	.0457	-.0494	.4051	.1350
16.24	.5538	.0500	-.0582	.5178	.2028
20.29	.7133	.0554	-.0717	.6498	.2994
22.33	.7995	.0583	-.0792	.7173	.3577

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.76	-.0963	.0322	.0211	-.0952	.0352
-.79	-.0716	.0316	.0193	-.0711	.0325
.22	-.0447	.0305	.0172	-.0448	.0303
1.22	-.0199	.0297	.0153	-.0205	.0292
2.23	.0076	.0291	.0134	.0065	.0294
4.25	.0634	.0277	.0093	.0612	.0324
6.28	.1214	.0268	.0054	.1177	.0399
8.19	.1719	.0259	.0023	.1664	.0501
10.24	.2314	.0249	-.0008	.2233	.0656
12.20	.2899	.0241	-.0035	.2782	.0848
16.23	.4179	.0223	-.0085	.3951	.1382
20.20	.5455	.0206	-.0142	.5048	.2077
22.27	.6258	.0196	-.0182	.5717	.2553

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.82	-.1875	.1127	.0494	-.1838	.1186
-.79	-.1614	.1115	.0480	-.1599	.1137
.21	-.1407	.1098	.0467	-.1411	.1093
1.22	-.1133	.1071	.0450	-.1155	.1047
2.21	-.0896	.1052	.0432	-.0936	.1017
4.18	-.0320	.1002	.0392	-.0393	.0976
6.21	.0189	.0974	.0360	.0082	.0989
8.22	.0835	.0938	.0320	.0693	.1047
10.22	.1376	.0921	.0299	.1190	.1150
12.24	.1947	.0914	.0286	.1709	.1306
16.23	.3131	.0906	.0268	.2752	.1745
20.27	.4396	.0919	.0251	.3805	.2385
22.28	.4990	.0920	.0236	.4269	.2743

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.78	-.0482	.0213	.0037	-.0475	.0228
-.81	-.0213	.0213	.0017	-.0210	.0216
.22	.0067	.0214	-.0004	.0066	.0214
1.23	.0285	.0214	-.0021	.0281	.0220
2.24	.0578	.0214	-.0043	.0570	.0237
4.24	.1127	.0214	-.0085	.1108	.0297
6.23	.1712	.0216	-.0130	.1679	.0400
8.23	.2261	.0220	-.0168	.2206	.0541
10.23	.2877	.0223	-.0208	.2791	.0731
12.28	.3587	.0224	-.0251	.3458	.0982
16.22	.4811	.0226	-.0321	.4556	.1561
20.20	.6281	.0237	-.0422	.5813	.2392
22.24	.7043	.0241	-.0475	.6428	.2888

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-1.79	-.1491	.0639	.0376	-.1470	.0685
-.79	-.1197	.0623	.0354	-.1188	.0639
.21	-.1011	.0612	.0342	-.1013	.0608
1.21	-.0730	.0590	.0320	-.0743	.0574
2.26	-.0422	.0577	.0298	-.0444	.0560
4.27	.0137	.0551	.0261	.0096	.0560
6.23	.0642	.0530	.0227	.0580	.0596
8.22	.1202	.0513	.0196	.1116	.0680
10.18	.1703	.0500	.0172	.1588	.0793
12.24	.2307	.0488	.0152	.2151	.0966
16.21	.3526	.0471	.0124	.3254	.1437
20.22	.4811	.0456	.0086	.4356	.2091
22.22	.5481	.0448	.0065	.4904	.2487

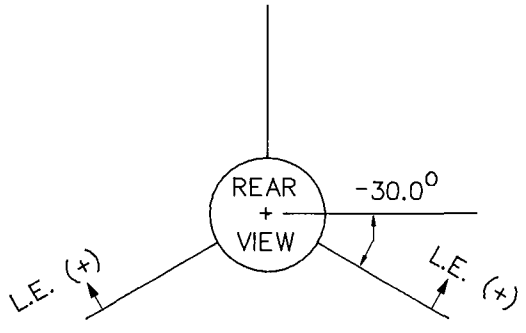


TABLE 6.- Concluded

(d) M = 2.86

$\delta_p = 10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.04	-.0028	.0268	-.0117	-.0018	.0269
-1.06	.0196	.0273	-.0131	.0201	.0269
-.02	.0441	.0279	-.0149	.0441	.0279
.96	.0641	.0286	-.0164	.0636	.0296
1.97	.0875	.0296	-.0182	.0864	.0326
3.97	.1401	.0314	-.0223	.1376	.0410
5.99	.1927	.0337	-.0265	.1882	.0536
7.98	.2477	.0362	-.0309	.2403	.0702
9.98	.2987	.0384	-.0348	.2875	.0896
11.96	.3546	.0410	-.0389	.3384	.1136
15.98	.4824	.0469	-.0488	.4509	.1779
19.97	.6203	.0541	-.0605	.5645	.2627
21.93	.6954	.0578	-.0669	.6235	.3134

$\delta_p = -10^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.06	-.0825	.0273	.0161	-.0815	.0303
-1.03	-.0608	.0270	.0149	-.0603	.0281
-.02	-.0373	.0263	.0136	-.0373	.0263
.96	-.0157	.0261	.0125	-.0161	.0258
1.99	.0045	.0258	.0114	.0036	.0259
3.96	.0499	.0252	.0092	.0480	.0286
5.99	.0971	.0249	.0071	.0940	.0349
7.96	.1399	.0247	.0053	.1351	.0439
9.97	.1932	.0245	.0037	.1860	.0576
11.99	.2417	.0245	.0024	.2313	.0742
15.96	.3449	.0245	-.0005	.3248	.1183
19.97	.4683	.0248	-.0049	.4317	.1832
21.98	.5337	.0247	-.0076	.4857	.2227

$\delta_p = -30^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.08	-.1635	.0994	.0421	-.1598	.1052
-1.03	-.1408	.0982	.0408	-.1390	.1007
-.07	-.1185	.0963	.0395	-.1184	.0965
.95	-.0979	.0952	.0383	-.0995	.0935
1.90	-.0797	.0940	.0373	-.0827	.0913
3.95	-.0306	.0922	.0348	-.0369	.0899
5.97	.0131	.0915	.0330	.0035	.0924
7.98	.0570	.0915	.0318	.0437	.0985
10.00	.1065	.0926	.0315	.0888	.1097
11.96	.1503	.0941	.0314	.1276	.1232
15.98	.2412	.0996	.0322	.2045	.1622
19.93	.3377	.1056	.0337	.2815	.2144
21.95	.3961	.1089	.0341	.3267	.2491

$\delta_p = 0^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.04	-.0427	.0187	.0024	-.0421	.0202
-1.04	-.0238	.0188	.0013	-.0235	.0192
-.04	-.0022	.0186	.0001	-.0022	.0186
.97	.0239	.0187	-.0015	.0236	.0191
1.97	.0450	.0189	-.0027	.0443	.0204
3.99	.0938	.0192	-.0055	.0923	.0256
5.97	.1403	.0196	-.0084	.1375	.0341
7.98	.1887	.0201	-.0111	.1841	.0461
9.98	.2448	.0206	-.0142	.2376	.0628
11.96	.2919	.0212	-.0161	.2811	.0812
15.99	.4117	.0226	-.0231	.3896	.1351
19.98	.5409	.0246	-.0308	.4999	.2079
21.99	.6181	.0256	-.0364	.5635	.2552

$\delta_p = -20^\circ$					
α,deg	C_N	C_A	C_m	C_L	C_D
-2.05	-.1260	.0540	.0305	-.1240	.0585
-1.05	-.1022	.0531	.0292	-.1012	.0549
-.06	-.0832	.0521	.0280	-.0831	.0522
.95	-.0617	.0513	.0268	-.0626	.0503
1.96	-.0383	.0506	.0257	-.0400	.0493
3.96	.0054	.0498	.0237	.0020	.0500
5.96	.0519	.0493	.0218	.0465	.0544
7.97	.0985	.0490	.0203	.0908	.0622
9.95	.1428	.0490	.0196	.1322	.0729
11.96	.1923	.0495	.0193	.1778	.0883
15.96	.2907	.0513	.0186	.2653	.1293
19.96	.4001	.0535	.0176	.3578	.1869
21.96	.4604	.0543	.0168	.4066	.2225

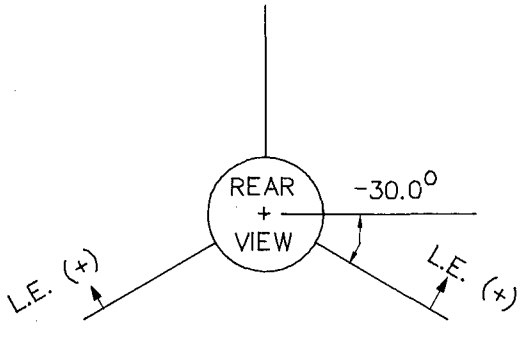


TABLE 7.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 1

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-1.97	-.0085	.0034	.0019
-.96	-.0084	.0035	.0017
.03	-.0085	.0036	.0014
1.04	-.0088	.0037	.0012
2.04	-.0087	.0037	.0009
4.03	-.0093	.0037	.0003
6.03	-.0097	.0037	-.0001
8.03	-.0101	.0034	-.0005
10.01	-.0103	.0030	-.0008
12.02	-.0099	.0016	-.0009
15.98	-.0107	-.0004	-.0011
20.01	-.0117	-.0019	-.0011
22.04	-.0119	-.0020	-.0010

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.21	-.0071	.0010	.0016
-1.23	-.0071	.0012	.0014
-.24	-.0072	.0013	.0012
.82	-.0073	.0015	.0009
1.78	-.0074	.0015	.0007
3.79	-.0081	.0018	.0002
5.79	-.0086	.0018	-.0001
7.79	-.0092	.0015	-.0002
9.78	-.0094	.0010	-.0002
11.78	-.0090	-.0003	-.0003
15.80	-.0119	-.0005	0.0000
19.82	-.0135	-.0003	.0002
21.78	-.0145	.0002	.0001

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-1.90	-.0066	.0003	.0014
-.84	-.0068	.0006	.0014
.18	-.0066	.0009	.0010
1.18	-.0071	.0009	.0007
2.17	-.0071	.0009	.0006
4.19	-.0074	.0011	.0001
6.19	-.0091	.0012	-.0001
8.18	-.0091	.0008	-.0001
10.15	-.0094	.0004	0.0000
12.16	-.0091	-.0007	.0001
16.13	-.0127	-.0004	.0001
20.16	-.0145	.0004	.0002
22.15	-.0159	.0013	.0002

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.12	-.0063	-.0007	.0014
-1.10	-.0060	-.0005	.0011
-.11	-.0063	-.0004	.0009
.93	-.0060	-.0001	.0007
1.92	-.0066	-.0001	.0004
3.92	-.0069	.0001	.0001
5.92	-.0077	.0001	0.0000
7.89	-.0086	-.0001	0.0000
9.91	-.0097	-.0005	.0001
11.90	-.0111	-.0001	.0001
15.91	-.0129	.0001	.0002
19.94	-.0146	.0007	.0001
21.91	-.0156	.0013	.0001

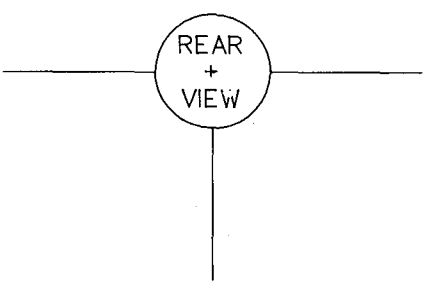


TABLE 8.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 2

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.29	-.0089	.0037	-.0009
-1.28	-.0088	.0037	-.0011
-.32	-.0086	.0036	-.0014
.72	-.0088	.0036	-.0017
1.70	-.0085	.0034	-.0019
3.72	-.0086	.0031	-.0025
5.71	-.0089	.0028	-.0031
7.70	-.0092	.0024	-.0034
9.73	-.0093	.0017	-.0037
11.69	-.0089	.0005	-.0038
15.70	-.0087	-.0027	-.0037
19.68	-.0077	-.0065	-.0036
21.73	-.0067	-.0076	-.0035

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.24	-.0074	.0016	-.0007
-1.26	-.0073	.0015	-.0009
-.24	-.0071	.0014	-.0011
.75	-.0071	.0013	-.0013
1.75	-.0071	.0011	-.0016
3.79	-.0072	.0008	-.0021
5.77	-.0074	.0003	-.0024
7.77	-.0075	-.0004	-.0025
9.76	-.0075	-.0014	-.0026
11.76	-.0071	-.0026	-.0027
15.75	-.0079	-.0053	-.0025
19.76	-.0081	-.0068	-.0020
21.78	-.0082	-.0073	-.0019

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.06	-.0067	.0010	-.0007
-1.12	-.0065	.0008	-.0007
-.07	-.0069	.0006	-.0011
.93	-.0063	.0005	-.0012
1.95	-.0066	.0004	-.0014
3.91	-.0057	0.0000	-.0017
5.98	-.0071	-.0006	-.0022
7.94	-.0072	-.0013	-.0022
9.98	-.0071	-.0027	-.0023
11.93	-.0070	-.0036	-.0021
15.93	-.0084	-.0059	-.0023
19.98	-.0088	-.0058	-.0017
21.93	-.0095	-.0064	-.0018

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.20	-.0066	0.0000	-.0004
-1.24	-.0063	0.0000	-.0006
-.18	-.0062	-.0002	-.0008
.84	-.0061	-.0003	-.0010
1.80	-.0059	-.0005	-.0012
3.84	-.0061	-.0010	-.0015
5.82	-.0066	-.0015	-.0017
7.82	-.0069	-.0023	-.0018
9.79	-.0070	-.0032	-.0017
11.80	-.0075	-.0043	-.0017
15.84	-.0083	-.0051	-.0016
19.80	-.0093	-.0059	-.0016
21.78	-.0099	-.0058	-.0017

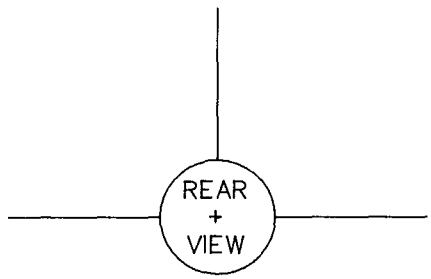


TABLE 9.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 3

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.20	-.0099	.0051	.0007
-1.19	-.0100	.0054	.0005
-.17	-.0104	.0058	.0003
.82	-.0103	.0057	.0001
1.83	-.0106	.0060	-.0002
3.84	-.0110	.0061	-.0007
5.82	-.0118	.0063	-.0011
7.81	-.0119	.0059	-.0018
9.84	-.0120	.0053	-.0024
11.84	-.0122	.0045	-.0025
15.82	-.0136	.0035	-.0023
19.80	-.0155	.0028	-.0024
21.85	-.0160	.0031	-.0025

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.24	-.0078	.0021	.0006
-1.24	-.0079	.0023	.0004
-.21	-.0081	.0025	.0002
.79	-.0084	.0028	0.0000
1.79	-.0085	.0030	-.0002
3.77	-.0092	.0034	-.0006
5.80	-.0102	.0035	-.0009
7.79	-.0107	.0035	-.0013
9.76	-.0107	.0028	-.0014
11.78	-.0107	.0018	-.0012
15.77	-.0133	.0013	-.0006
19.78	-.0147	.0016	-.0005
21.81	-.0154	.0018	-.0006

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.01	-.0077	.0015	.0005
-1.01	-.0076	.0016	.0004
0.00	-.0080	.0019	.0002
.97	-.0077	.0021	0.0000
1.96	-.0080	.0022	-.0002
3.95	-.0087	.0025	-.0006
5.96	-.0100	.0027	-.0009
7.98	-.0114	.0027	-.0013
9.95	-.0102	.0017	-.0011
11.96	-.0104	.0007	-.0007
15.98	-.0137	.0018	-.0003
19.96	-.0148	.0016	-.0003
21.97	-.0160	.0022	-.0002

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.48	-.0066	.0002	.0006
-1.49	-.0063	.0003	.0005
-.47	-.0063	.0004	.0003
.55	-.0067	.0007	.0001
1.53	-.0069	.0009	-.0001
3.55	-.0083	.0014	-.0005
5.54	-.0090	.0015	-.0007
7.55	-.0101	.0016	-.0010
9.52	-.0103	.0011	-.0008
11.51	-.0116	.0011	-.0006
15.55	-.0132	.0004	-.0002
19.53	-.0141	.0012	-.0002
21.54	-.0151	.0018	-.0003

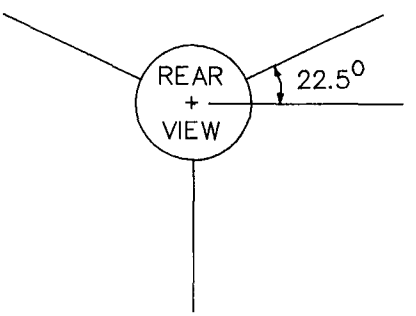


TABLE 10.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 4

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.17	-.0106	.0060	.0003
-1.16	-.0104	.0058	0.0000
-.18	-.0104	.0057	-.0002
.83	-.0099	.0054	-.0005
1.82	-.0101	.0052	-.0007
3.83	-.0098	.0047	-.0012
5.82	-.0097	.0040	-.0015
7.82	-.0096	.0030	-.0019
9.83	-.0092	.0020	-.0021
11.83	-.0088	.0005	-.0022
15.83	-.0077	-.0036	-.0020
19.85	-.0066	-.0072	-.0021
21.83	-.0057	-.0091	-.0019

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.14	-.0088	.0032	.0002
-1.12	-.0084	.0029	0.0000
-.13	-.0082	.0026	-.0002
.89	-.0081	.0025	-.0004
1.89	-.0082	.0023	-.0006
3.88	-.0081	.0018	-.0010
5.87	-.0082	.0013	-.0012
7.88	-.0083	.0004	-.0013
9.87	-.0080	-.0009	-.0013
11.88	-.0073	-.0026	-.0013
15.88	-.0081	-.0054	-.0011
19.88	-.0081	-.0070	-.0009
21.86	-.0079	-.0076	-.0008

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-1.71	-.0079	.0021	.0002
-.70	-.0076	.0020	-.0001
.25	-.0079	.0020	-.0002
1.29	-.0071	.0016	-.0005
2.33	-.0076	.0014	-.0007
4.31	-.0080	.0010	-.0010
6.26	-.0079	.0004	-.0010
8.30	-.0077	-.0005	-.0010
10.32	-.0076	-.0018	-.0011
12.30	-.0066	-.0033	-.0009
16.29	-.0084	-.0053	-.0009
20.28	-.0087	-.0057	-.0006
22.29	-.0096	-.0062	-.0006

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.05	-.0073	.0009	.0002
-1.02	-.0067	.0007	-.0001
-.05	-.0068	.0006	-.0002
.96	-.0066	.0005	-.0003
1.96	-.0066	.0005	-.0005
3.99	-.0067	-.0001	-.0006
5.96	-.0075	-.0008	-.0009
7.99	-.0074	-.0015	-.0009
9.96	-.0075	-.0026	-.0008
11.95	-.0082	-.0037	-.0009
15.96	-.0092	-.0046	-.0007
19.96	-.0088	-.0049	-.0005
21.97	-.0100	-.0050	-.0006

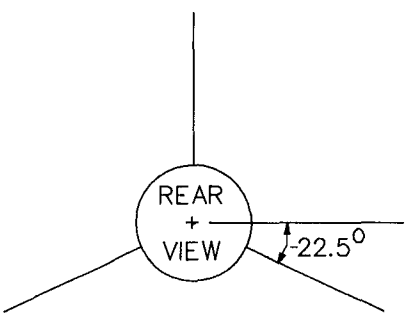


TABLE 11.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 5

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.13	-.0112	.0067	.0004
-1.15	-.0114	.0070	.0001
-.15	-.0115	.0072	-.0001
.88	-.0118	.0075	-.0004
1.88	-.0120	.0077	-.0006
3.87	-.0125	.0080	-.0011
5.89	-.0129	.0080	-.0014
7.89	-.0131	.0074	-.0016
9.88	-.0131	.0069	-.0020
11.88	-.0137	.0064	-.0028
15.87	-.0143	.0051	-.0029
19.87	-.0169	.0044	-.0021
21.86	-.0177	.0041	-.0022

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.30	-.0088	.0034	.0004
-1.31	-.0089	.0036	.0002
-.32	-.0091	.0039	0.0000
.72	-.0093	.0040	-.0002
1.68	-.0095	.0042	-.0003
3.72	-.0102	.0046	-.0007
5.68	-.0110	.0050	-.0010
7.68	-.0116	.0047	-.0013
9.69	-.0119	.0042	-.0015
11.68	-.0118	.0032	-.0018
15.71	-.0139	.0022	-.0006
19.69	-.0154	.0022	-.0002
21.68	-.0158	.0021	-.0004

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.01	-.0089	.0027	.0003
-1.02	-.0090	.0030	.0002
-.01	-.0087	.0031	0.0000
1.01	-.0086	.0030	-.0002
2.00	-.0088	.0033	-.0004
4.01	-.0101	.0039	-.0008
6.00	-.0112	.0043	-.0011
8.00	-.0108	.0036	-.0012
10.00	-.0122	.0034	-.0015
11.98	-.0124	.0025	-.0015
16.02	-.0144	.0019	-.0002
20.02	-.0159	.0022	0.0000
22.05	-.0165	.0022	0.0000

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{l_β}
-2.24	-.0072	.0010	.0004
-1.22	-.0077	.0012	.0002
-.24	-.0075	.0013	.0001
.78	-.0073	.0014	-.0001
1.77	-.0078	.0015	-.0002
3.78	-.0082	.0019	-.0005
5.79	-.0094	.0024	-.0007
7.77	-.0106	.0023	-.0010
9.77	-.0118	.0027	-.0012
11.77	-.0124	.0024	-.0010
15.78	-.0142	.0020	-.0004
19.78	-.0153	.0020	-.0002
21.76	-.0158	.0022	-.0002

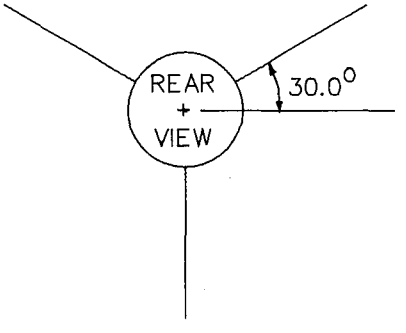


TABLE 12.- LATERAL-DIRECTIONAL STABILITY CHARACTERISTICS OF MODEL 6

M = 1.70			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.30	-.0120	.0076	.0007
-1.29	-.0116	.0073	.0004
-.27	-.0110	.0069	.0002
.73	-.0112	.0069	-.0001
1.74	-.0110	.0066	-.0003
3.74	-.0109	.0061	-.0007
5.74	-.0109	.0054	-.0011
7.74	-.0108	.0047	-.0014
9.74	-.0106	.0036	-.0016
11.75	-.0099	.0021	-.0018
15.73	-.0085	-.0020	-.0015
19.73	-.0078	-.0061	-.0010
21.76	-.0072	-.0073	-.0009

M = 2.16			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.14	-.0098	.0043	.0004
-1.15	-.0095	.0041	.0002
-.14	-.0093	.0038	0.0000
.86	-.0091	.0037	-.0002
1.85	-.0092	.0035	-.0004
3.86	-.0092	.0032	-.0006
5.85	-.0092	.0025	-.0008
7.87	-.0092	.0015	-.0009
9.87	-.0090	.0002	-.0009
11.87	-.0083	-.0014	-.0008
15.86	-.0092	-.0041	-.0006
19.86	-.0091	-.0060	-.0003
21.87	-.0093	-.0064	-.0002

M = 2.36			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-1.78	-.0091	.0033	.0003
-.81	-.0090	.0032	.0002
.22	-.0081	.0029	0.0000
1.23	-.0083	.0028	-.0002
2.24	-.0080	.0024	-.0005
4.24	-.0083	.0021	-.0006
6.23	-.0087	.0016	-.0007
8.23	-.0089	.0009	-.0008
10.23	-.0085	-.0008	-.0008
12.28	-.0082	-.0021	-.0006
16.22	-.0097	-.0041	-.0005
20.20	-.0099	-.0048	-.0002
22.24	-.0105	-.0048	-.0002

M = 2.86			
α,deg	C_{Y_β}	C_{n_β}	C_{ℓ_β}
-2.04	-.0080	.0016	.0003
-1.04	-.0075	.0015	.0001
-.04	-.0077	.0014	-.0001
.97	-.0074	.0012	-.0002
1.97	-.0075	.0011	-.0003
3.99	-.0074	.0008	-.0005
5.97	-.0079	.0004	-.0005
7.98	-.0086	-.0003	-.0006
9.98	-.0083	-.0014	-.0006
11.96	-.0091	-.0024	-.0006
15.99	-.0097	-.0030	-.0004
19.98	-.0103	-.0036	-.0002
21.99	-.0108	-.0037	-.0001

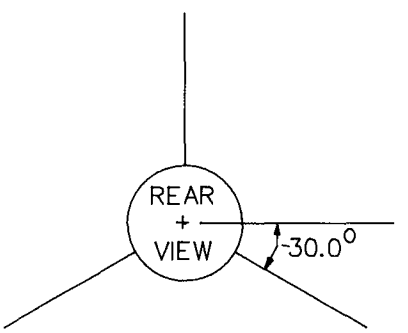


TABLE 13.- ROLL-CONTROL CHARACTERISTICS OF MODEL 1 WITH TWO SURFACES DEFLECTED

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-1.97	.0015	-.0007	-.0001
-.96	.0013	-.0007	-.0001
.04	.0013	-.0007	-.0001
1.04	.0017	-.0008	-.0002
2.04	.0013	-.0007	-.0002
4.03	.0013	-.0006	0.0000
6.03	.0007	-.0002	.0001
8.03	.0001	-.0003	.0003
10.01	.0006	-.0003	.0004
12.02	-.0004	.0002	.0005
15.98	-.0005	.0003	.0007
20.01	-.0003	.0003	.0002
22.04	-.0022	.0003	.0003

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.00	.0032	-.0028	.0104
-1.00	.0028	-.0027	.0102
0.00	.0029	-.0029	.0101
1.00	.0027	-.0028	.0102
1.98	.0027	-.0031	.0104
4.03	.0026	-.0034	.0108
6.01	.0027	-.0038	.0110
7.98	.0022	-.0042	.0111
9.99	.0021	-.0046	.0110
12.01	.0029	-.0065	.0108
14.03	.0035	-.0074	.0106
16.02	.0036	-.0082	.0103
20.03	.0047	-.0106	.0086

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.02	.0055	-.0054	.0208
-1.00	.0055	-.0058	.0208
-.01	.0053	-.0061	.0210
1.02	.0056	-.0064	.0208
1.99	.0057	-.0066	.0210
3.98	.0052	-.0071	.0214
6.00	.0050	-.0075	.0214
8.02	.0044	-.0082	.0213
10.03	.0051	-.0098	.0209
12.01	.0064	-.0123	.0208
15.99	.0079	-.0167	.0194
20.04	.0093	-.0207	.0170
21.98	.0105	-.0247	.0160

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.21	.0010	-.0005	-.0001
-1.23	.0009	-.0004	-.0001
-.23	.0010	-.0005	-.0001
.82	.0008	-.0004	0.0000
1.78	.0006	-.0003	-.0001
3.79	.0005	-.0003	0.0000
5.79	-.0001	.0001	.0002
7.79	-.0002	0.0000	.0002
9.78	-.0008	0.0000	.0002
11.78	-.0009	.0002	.0002
15.80	-.0003	-.0003	.0001
19.82	-.0002	-.0005	-.0002
21.78	.0001	-.0010	-.0002

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.26	.0020	-.0012	.0083
-1.26	.0021	-.0014	.0084
-.21	.0020	-.0015	.0084
.78	.0018	-.0013	.0084
1.80	.0019	-.0016	.0084
2.78	.0017	-.0018	.0086
3.77	.0018	-.0020	.0086
5.77	.0014	-.0024	.0087
7.79	.0015	-.0032	.0086
9.76	.0018	-.0043	.0084
11.79	.0022	-.0052	.0080
15.79	.0035	-.0073	.0074
19.81	.0042	-.0090	.0069

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.23	.0024	-.0018	.0169
-1.22	.0024	-.0022	.0169
-.20	.0027	-.0025	.0170
.80	.0026	-.0028	.0170
1.85	.0027	-.0031	.0170
3.78	.0027	-.0040	.0170
5.80	.0026	-.0046	.0167
7.80	.0022	-.0053	.0163
9.78	.0026	-.0070	.0160
11.79	.0040	-.0092	.0156
15.79	.0062	-.0139	.0147
19.81	.0078	-.0174	.0142
21.76	.0085	-.0189	.0143

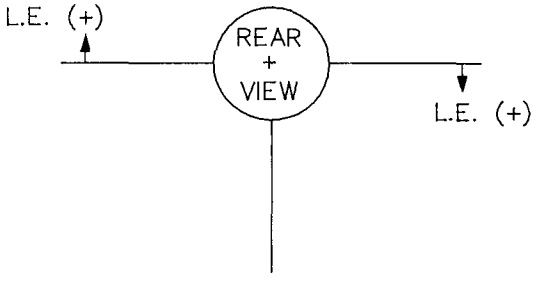


TABLE 13.- Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-1.90	.0020	-.0008	0.0000
-.84	.0023	-.0011	-.0001
.22	.0020	-.0012	0.0000
1.18	.0024	-.0011	.0001
2.17	.0020	-.0009	-.0001
4.19	.0010	-.0012	.0001
6.19	.0027	-.0012	.0004
8.18	.0015	-.0011	.0003
10.15	.0010	-.0012	.0002
12.16	-.0002	-.0017	-.0001
16.13	.0016	-.0013	.0002
20.16	.0024	-.0022	0.0000
22.15	.0040	-.0030	.0001

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-1.84	.0025	-.0010	.0079
-.83	.0020	-.0012	.0078
.19	.0026	-.0017	.0079
1.17	.0028	-.0017	.0080
2.13	.0019	-.0016	.0079
4.17	.0026	-.0022	.0082
6.15	.0023	-.0031	.0081
8.17	.0030	-.0043	.0078
10.16	.0017	-.0038	.0077
12.16	.0037	-.0060	.0074
16.17	.0035	-.0083	.0069
20.15	.0093	-.0110	.0073
22.16	.0056	-.0125	.0072

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-1.83	.0045	-.0013	.0154
-.84	.0035	-.0019	.0160
.17	.0028	-.0021	.0160
1.18	.0029	-.0025	.0158
2.14	.0034	-.0031	.0157
4.17	.0031	-.0042	.0157
6.17	.0025	-.0043	.0155
8.16	.0042	-.0062	.0149
10.15	.0036	-.0068	.0146
12.20	.0063	-.0095	.0143
16.16	.0068	-.0139	.0137
20.18	.0104	-.0192	.0141
22.11	.0107	-.0202	.0144

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.12	.0017	-.0004	-.0001
-1.10	.0009	-.0006	.0001
-.11	.0005	-.0004	0.0000
.93	.0004	-.0005	0.0000
1.92	.0007	-.0004	.0002
3.92	.0008	-.0005	.0003
5.92	.0004	-.0004	.0001
7.89	.0005	-.0003	.0002
9.91	.0009	.0003	.0001
11.90	-.0002	-.0005	.0001
15.91	.0020	.0002	.0001
19.94	.0020	-.0007	.0002
21.91	.0017	-.0022	.0003

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.10	.0010	-.0004	.0060
-1.13	.0016	-.0006	.0062
-.11	.0007	-.0006	.0062
.92	.0014	-.0007	.0062
1.90	.0007	-.0009	.0061
3.91	.0013	-.0016	.0064
5.90	.0012	-.0022	.0063
7.88	.0015	-.0025	.0062
9.93	.0030	-.0038	.0060
11.89	.0024	-.0040	.0057
15.93	.0035	-.0062	.0063
19.87	.0040	-.0080	.0069
21.89	.0038	-.0084	.0076

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.10	.0012	0.0000	.0127
-1.11	.0020	-.0003	.0127
-.06	.0017	-.0008	.0130
.94	.0018	-.0011	.0129
1.89	.0018	-.0014	.0127
3.91	.0017	-.0026	.0125
5.92	.0025	-.0036	.0123
7.90	.0028	-.0042	.0119
11.92	.0039	-.0084	.0114
15.90	.0079	-.0121	.0125
19.90	.0072	-.0139	.0138
21.89	.0081	-.0163	.0146

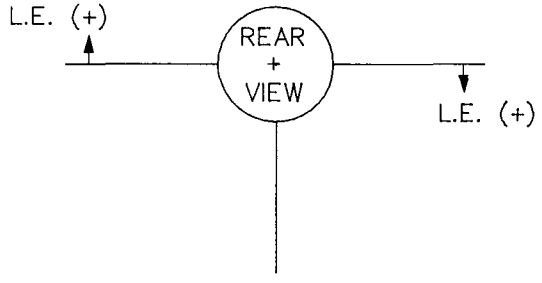


TABLE 14.- ROLL-CONTROL CHARACTERISTICS OF MODEL 2 WITH TWO SURFACES DEFLECTED

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.29	.0014	-.0002	.0002
-1.28	.0010	-.0002	.0001
-.32	.0012	-.0003	.0002
.72	.0009	-.0001	.0003
1.70	.0006	0.0000	.0003
3.72	.0005	-.0001	.0004
5.71	0.0000	.0001	.0006
7.70	-.0003	.0001	.0006
9.73	.0002	-.0001	.0009
11.69	-.0004	.0002	.0010
15.70	-.0013	.0005	.0011
19.68	-.0027	.0014	.0010
21.73	-.0044	.0019	.0013

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.29	-.0012	.0028	.0106
-1.32	-.0013	.0027	.0104
-.31	-.0015	.0028	.0104
.71	-.0011	.0024	.0105
1.74	-.0017	.0026	.0106
3.71	-.0015	.0022	.0111
5.75	-.0012	.0012	.0113
7.70	-.0005	-.0002	.0115
9.69	-.0006	-.0013	.0111
11.71	.0004	-.0030	.0109
15.73	.0002	-.0049	.0104
19.73	.0008	-.0068	.0094
21.70	-.0002	-.0079	.0093

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.30	-.0040	.0068	.0212
-1.29	-.0040	.0062	.0211
-.29	-.0036	.0058	.0211
.72	-.0041	.0057	.0209
1.73	-.0035	.0051	.0209
3.73	-.0036	.0043	.0214
5.71	-.0021	.0021	.0215
7.68	-.0012	-.0005	.0212
9.73	.0003	-.0037	.0209
11.69	.0014	-.0062	.0207
15.69	.0028	-.0100	.0194
19.75	.0049	-.0159	.0181
21.72	.0053	-.0180	.0169

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0009	-.0001	.0002
-1.26	.0008	-.0002	.0002
-.23	.0009	-.0001	.0002
.75	.0005	0.0000	.0002
1.75	.0005	.0001	.0003
3.79	.0003	.0002	.0004
5.77	0.0000	.0003	.0005
7.77	-.0005	.0002	.0005
9.76	-.0009	.0002	.0005
11.76	-.0011	.0002	.0005
15.75	-.0012	0008	.0005
19.76	-.0013	.0006	.0004
21.78	-.0014	.0009	.0004

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.25	-.0002	.0022	.0171
-1.28	-.0001	.0020	.0172
-.25	-.0002	.0018	.0174
.76	-.0001	.0016	.0173
1.80	0.0000	.0011	.0172
3.76	.0001	0.0000	.0174
5.79	.0006	-.0018	.0169
7.77	.0014	-.0036	.0164
9.76	.0019	-.0056	.0161
11.74	.0026	-.0072	.0156
15.79	.0053	-.0118	.0146
19.75	.0069	-.0156	.0141
21.79	.0073	-.0169	.0144

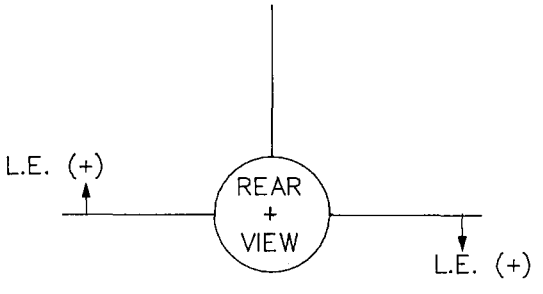


TABLE 14.- Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.06	.0014	-.0001	.0006
-1.12	.0015	-.0001	.0004
-.07	.0014	0.0000	.0005
.93	.0010	.0001	.0004
1.95	.0011	.0003	.0006
3.91	.0001	0.0000	.0005
5.98	.0005	.0002	.0009
7.94	-.0003	.0004	.0007
9.98	-.0002	.0006	.0009
11.93	-.0007	.0001	.0004
15.93	.0008	.0016	.0011
19.98	.0001	0.0000	.0007
21.93	-.0008	.0002	.0006

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.08	.0005	.0018	.0159
-1.00	.0012	.0011	.0164
-.02	.0007	.0012	.0166
.95	.0009	.0009	.0166
1.96	0.0000	.0003	.0162
3.99	.0014	-.0014	.0163
5.96	.0014	-.0027	.0161
7.97	.0025	-.0042	.0156
9.95	.0026	-.0057	.0149
11.94	.0031	-.0073	.0145
15.99	.0046	-.0128	.0135
19.98	.0064	-.0165	.0142
21.96	.0077	-.0176	.0147

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.20	.0016	-.0003	.0002
-1.24	.0012	-.0004	.0002
-.18	.0012	-.0001	.0003
.84	.0009	-.0001	.0003
1.80	.0005	0.0000	.0003
3.84	.0006	.0001	.0004
5.82	-.0002	.0001	.0003
7.82	-.0001	.0002	.0004
9.79	-.0001	.0003	.0004
11.80	-.0002	.0007	.0004
15.84	.0006	.0007	.0007
19.80	0.0000	.0006	.0007
21.78	-.0003	.0009	.0005

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.23	.0001	.0002	.0063
-1.21	.0009	0.0000	.0064
-.15	.0003	.0002	.0065
.79	.0002	.0002	.0064
1.84	.0005	.0001	.0064
3.82	-.0003	-.0002	.0065
5.77	.0005	-.0003	.0066
7.82	0.0000	-.0010	.0066
9.83	.0009	-.0014	.0063
11.81	.0014	-.0025	.0061
15.80	.0029	-.0039	.0067
19.83	.0029	-.0065	.0074
21.84	.0031	-.0069	.0077

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.18	.0009	.0008	.0128
-1.21	.0004	.0006	.0130
-.16	.0011	.0002	.0132
.80	.0001	-.0001	.0129
1.80	.0007	-.0004	.0130
3.83	.0009	-.0014	.0128
5.82	.0011	-.0027	.0123
7.84	.0015	-.0037	.0120
9.84	.0014	-.0056	.0112
11.83	.0039	-.0071	.0118
15.80	.0042	-.0109	.0122
19.80	.0059	-.0130	.0138
21.82	.0064	-.0152	.0147

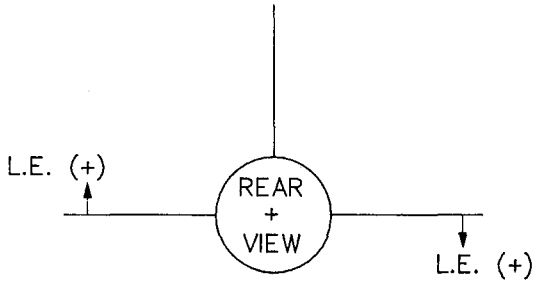


TABLE 15.- ROLL-CONTROL CHARACTERISTICS OF MODEL 3 WITH TWO SURFACES DEFLECTED

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.20	.0009	0.0000	.0005
-1.19	.0010	-.0002	.0005
-.16	.0003	0.0000	.0006
.82	.0009	-.0002	.0005
1.83	.0011	-.0004	.0005
3.84	.0007	-.0004	.0008
5.82	.0014	-.0012	.0009
7.81	.0011	-.0011	.0010
9.84	0.0000	-.0005	.0010
11.84	-.0003	-.0005	.0008
15.82	-.0010	-.0003	.0010
19.80	-.0021	-.0007	.0015
21.85	-.0036	-.0006	.0014

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.14	.0190	-.0214	.0120
-1.14	.0199	-.0224	.0122
-.15	.0203	-.0229	.0122
.87	.0202	-.0234	.0122
1.88	.0203	-.0239	.0124
3.87	.0204	-.0243	.0125
5.89	.0198	-.0236	.0127
7.86	.0193	-.0225	.0121
9.88	.0167	-.0199	.0108
11.86	.0139	-.0169	.0094
15.88	.0113	-.0150	.0080
19.87	.0117	-.0154	.0073
21.89	.0118	-.0167	.0071

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.19	.0366	-.0426	.0232
-1.18	.0372	-.0438	.0234
-.19	.0375	-.0447	.0235
.86	.0382	-.0458	.0235
1.83	.0385	-.0467	.0236
3.88	.0382	-.0467	.0235
5.86	.0371	-.0452	.0231
7.85	.0344	-.0419	.0217
9.87	.0310	-.0383	.0194
11.86	.0278	-.0347	.0171
15.90	.0230	-.0307	.0147
19.93	.0225	-.0305	.0134
21.88	.0231	-.0326	.0134

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0009	-.0001	.0003
-1.24	.0007	.0001	.0003
-.21	.0005	.0001	.0002
.79	.0009	.0001	.0002
1.79	.0004	.0002	.0002
3.77	.0002	.0003	.0003
5.80	.0006	0.0000	.0004
7.79	.0002	-.0001	.0006
9.76	0.0000	-.0003	.0006
11.78	-.0004	-.0003	.0005
15.77	-.0006	0.0000	.0004
19.78	-.0012	-.0002	.0003
21.81	-.0014	-.0004	.0004

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.30	.0134	-.0151	.0091
-1.29	.0135	-.0153	.0090
-.29	.0135	-.0157	.0091
.71	.0140	-.0160	.0091
1.71	.0140	-.0163	.0091
3.71	.0138	-.0168	.0093
5.71	.0139	-.0170	.0093
7.73	.0133	-.0161	.0085
9.72	.0109	-.0136	.0072
11.71	.0091	-.0114	.0062
15.72	.0085	-.0105	.0049
19.72	.0092	-.0121	.0048
21.73	.0106	-.0139	.0047

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.38	.0268	-.0303	.0182
-1.33	.0267	-.0308	.0182
-.37	.0269	-.0315	.0183
.71	.0273	-.0323	.0183
1.71	.0275	-.0330	.0184
3.71	.0281	-.0342	.0186
5.71	.0272	-.0335	.0180
7.69	.0257	-.0315	.0162
9.71	.0218	-.0266	.0136
11.69	.0180	-.0229	.0116
15.70	.0159	-.0208	.0095
19.76	.0178	-.0244	.0092
21.73	.0198	-.0270	.0092

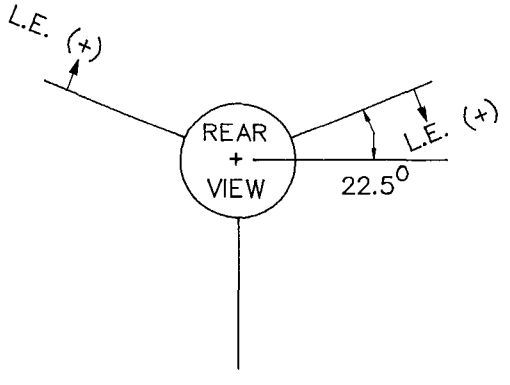


TABLE 15.- Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.01	.0032	-.0010	.0003
-1.01	.0029	-.0010	.0004
0.00	.0023	-.0010	.0003
.97	.0009	-.0007	.0003
1.96	.0017	-.0007	.0003
3.95	.0013	-.0006	.0005
5.96	.0028	-.0016	.0006
7.98	.0040	-.0020	.0009
9.95	-.0002	-.0004	.0005
11.96	.0003	-.0009	.0004
15.98	.0014	-.0016	.0003
19.96	-.0011	-.0006	.0002
21.97	.0012	-.0016	.0002

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.04	.0130	-.0135	.0080
-1.04	.0141	-.0143	.0081
-.01	.0147	-.0150	.0085
1.00	.0137	-.0151	.0081
1.98	.0145	-.0155	.0085
3.97	.0135	-.0154	.0085
5.98	.0141	-.0156	.0087
7.97	.0124	-.0148	.0075
9.97	.0106	-.0123	.0064
11.97	.0093	-.0104	.0055
15.97	.0078	-.0107	.0041
20.00	.0085	-.0130	.0042
22.02	.0102	-.0146	.0043

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.01	.0249	-.0267	.0162
-1.07	.0238	-.0269	.0164
-.04	.0246	-.0278	.0163
.94	.0239	-.0281	.0161
1.97	.0246	-.0290	.0163
3.95	.0250	-.0302	.0165
5.93	.0256	-.0300	.0162
7.96	.0232	-.0282	.0144
9.99	.0196	-.0231	.0119
11.92	.0148	-.0193	.0102
15.93	.0181	-.0203	.0083
19.95	.0179	-.0229	.0082
21.94	.0205	-.0254	.0084

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.48	.0008	-.0002	.0002
-1.49	.0005	-.0003	.0002
-.47	0.0000	0.0000	.0002
.55	.0007	-.0002	.0003
1.53	.0006	-.0003	.0004
3.55	.0006	-.0005	.0003
5.54	.0012	-.0005	.0004
7.55	.0006	-.0005	.0005
9.52	.0004	-.0004	.0003
11.51	.0004	-.0003	.0002
15.55	.0006	.0001	.0002
19.53	-.0011	-.0005	.0002
21.54	-.0006	-.0011	.0003

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.31	.0096	-.0102	.0065
-1.30	.0095	-.0103	.0065
-.30	.0094	-.0102	.0064
.69	.0093	-.0105	.0064
1.71	.0104	-.0109	.0065
3.72	.0101	-.0115	.0066
5.70	.0095	-.0111	.0063
7.71	.0091	-.0101	.0059
9.71	.0071	-.0088	.0046
11.70	.0067	-.0066	.0040
15.71	.0083	-.0076	.0037
19.70	.0092	-.0100	.0039
21.71	.0105	-.0116	.0043

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.43	.0187	-.0208	.0135
-1.36	.0179	-.0210	.0133
-.32	.0184	-.0214	.0133
.72	.0187	-.0218	.0133
1.66	.0184	-.0222	.0132
3.69	.0184	-.0227	.0132
5.69	.0183	-.0223	.0126
7.71	.0171	-.0214	.0112
9.64	.0144	-.0175	.0092
11.72	.0123	-.0147	.0076
15.68	.0147	-.0170	.0071
19.68	.0156	-.0198	.0073
21.63	.0151	-.0214	.0078

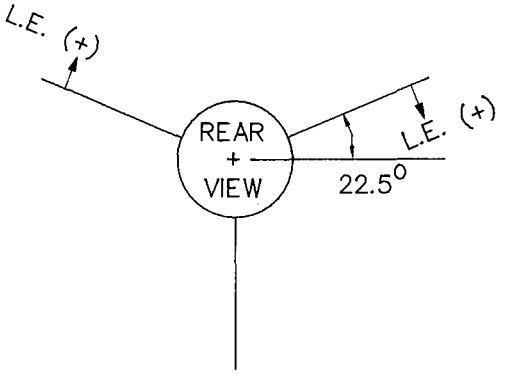


TABLE 16.- ROLL-CONTROL CHARACTERISTICS OF MODEL 4 WITH TWO SURFACES DEFLECTED

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.17	.0011	-.0005	.0005
-1.16	.0008	-.0005	.0005
-.18	.0017	-.0010	.0005
.83	.0003	-.0003	.0005
1.82	.0015	-.0009	.0005
3.83	.0008	-.0005	.0005
5.82	-.0001	-.0001	.0006
7.82	-.0002	0.0000	.0007
9.83	-.0009	.0005	.0008
11.83	-.0012	.0007	.0009
15.83	-.0027	.0011	.0009
19.85	-.0046	.0016	.0012
21.83	-.0058	.0037	.0012

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.35	-.0173	.0229	.0123
-1.31	-.0167	.0221	.0122
-.33	-.0170	.0219	.0123
.67	-.0168	.0215	.0122
1.67	-.0160	.0205	.0122
3.66	-.0158	.0197	.0123
5.69	-.0146	.0182	.0125
7.68	-.0148	.0176	.0126
9.67	-.0142	.0165	.0123
11.68	-.0143	.0160	.0120
15.67	-.0147	.0152	.0117
19.67	-.0137	.0137	.0117
21.69	-.0141	.0124	.0115

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.33	-.0350	.0453	.0235
-1.35	-.0354	.0450	.0236
-.40	-.0352	.0443	.0235
.72	-.0346	.0432	.0236
1.70	-.0340	.0421	.0236
3.67	-.0327	.0398	.0234
5.70	-.0315	.0375	.0235
7.67	-.0309	.0355	.0234
9.70	-.0299	.0334	.0233
11.70	-.0291	.0317	.0227
15.72	-.0275	.0280	.0221
19.74	-.0249	.0222	.0213
21.67	-.0240	.0208	.0210

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.14	.0014	-.0007	.0002
-1.12	.0009	-.0004	.0003
-.11	.0011	-.0006	.0002
.89	.0008	-.0005	.0003
1.89	.0008	-.0004	.0003
3.88	.0004	-.0001	.0004
5.87	.0001	.0001	.0005
7.88	-.0001	.0002	.0006
9.87	-.0008	.0005	.0006
11.88	-.0012	.0007	.0007
15.88	-.0018	.0016	.0008
19.88	-.0023	.0017	.0007
21.86	-.0030	.0024	.0008

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.26	-.0112	.0155	.0091
-1.26	-.0114	.0153	.0092
-.24	-.0111	.0150	.0093
.77	-.0110	.0146	.0093
1.77	-.0110	.0145	.0093
3.75	-.0109	.0139	.0094
5.77	-.0107	.0134	.0096
7.77	-.0108	.0132	.0098
9.76	-.0113	.0134	.0100
11.79	-.0117	.0134	.0104
15.75	-.0111	.0129	.0109
19.75	-.0125	.0128	.0116
21.76	-.0129	.0133	.0119

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.27	-.0244	.0318	.0183
-1.31	-.0243	.0315	.0184
-.19	-.0240	.0307	.0184
.81	-.0238	.0300	.0184
1.75	-.0235	.0293	.0183
3.84	-.0234	.0280	.0184
5.79	-.0228	.0267	.0185
7.80	-.0223	.0256	.0185
9.78	-.0227	.0253	.0188
11.72	-.0231	.0254	.0193
15.77	-.0218	.0234	.0203
19.81	-.0232	.0236	.0221
21.84	-.0245	.0244	.0229

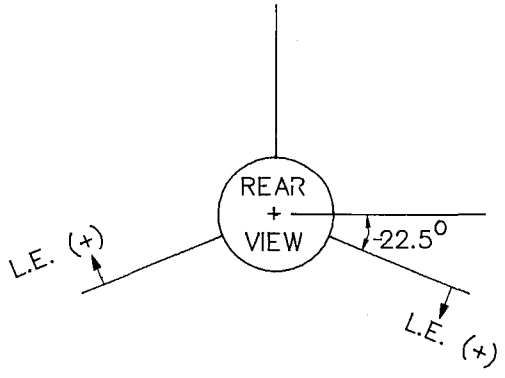


TABLE 16.- Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-1.71	.0012	-.0003	.0001
-.70	.0016	-.0007	.0003
.29	.0011	-.0005	.0003
1.29	.0006	-.0003	.0004
2.33	.0012	0.0000	.0007
4.31	.0016	-.0002	.0008
6.26	.0009	-.0001	.0007
8.30	.0001	.0001	.0006
10.32	-.0008	.0003	.0007
12.30	-.0014	.0013	.0007
16.29	-.0009	.0015	.0010
20.28	-.0026	.0008	.0008
22.29	-.0022	.0008	.0008

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.03	-.0073	.0127	.0079
-.99	-.0083	.0128	.0081
0.00	-.0089	.0126	.0083
1.01	-.0088	.0126	.0084
2.00	-.0094	.0125	.0085
4.01	-.0078	.0120	.0090
6.03	-.0085	.0120	.0092
8.02	-.0095	.0120	.0096
10.03	-.0101	.0121	.0098
12.01	-.0108	.0124	.0102
15.99	-.0104	.0129	.0111
20.00	-.0109	.0132	.0122
22.04	-.0123	.0120	.0128

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-1.97	-.0192	.0270	.0162
-.98	-.0200	.0267	.0166
.04	-.0199	.0263	.0165
1.02	-.0190	.0253	.0163
2.02	-.0202	.0253	.0166
4.05	-.0192	.0244	.0169
6.00	-.0202	.0236	.0169
7.99	-.0196	.0232	.0176
10.02	-.0206	.0240	.0185
12.04	-.0198	.0239	.0192
16.04	-.0209	.0221	.0206
20.01	-.0229	.0229	.0227
22.01	-.0247	.0231	.0237

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.05	.0014	-.0006	.0001
-1.02	.0009	-.0007	.0003
0.00	.0007	-.0004	.0002
.96	.0008	-.0005	.0001
1.96	.0008	-.0006	.0001
3.99	.0004	-.0002	.0002
5.96	.0006	.0002	.0004
7.99	.0002	.0004	.0005
9.96	-.0003	.0011	.0006
11.95	-.0004	.0013	.0006
15.96	-.0009	.0016	.0007
19.96	-.0030	.0012	.0007
21.97	-.0020	.0018	.0008

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-1.97	-.0072	.0102	.0065
-1.00	-.0070	.0098	.0065
-.01	-.0074	.0096	.0065
1.03	-.0072	.0097	.0066
2.01	-.0077	.0099	.0069
4.05	-.0079	.0099	.0071
6.02	-.0085	.0103	.0076
8.02	-.0088	.0101	.0080
9.99	-.0087	.0114	.0087
12.00	-.0094	.0116	.0094
16.02	-.0105	.0129	.0109
20.03	-.0120	.0141	.0124
22.04	-.0142	.0142	.0133

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.00	-.0161	.0216	.0132
-1.03	-.0160	.0211	.0131
-.02	-.0166	.0207	.0133
1.02	-.0162	.0206	.0135
2.03	-.0155	.0204	.0137
4.06	-.0159	.0205	.0145
6.01	-.0169	.0206	.0151
8.03	-.0183	.0211	.0160
10.05	-.0191	.0218	.0170
12.01	-.0200	.0218	.0181
16.00	-.0220	.0237	.0208
20.23	-.0250	.0260	.0239
22.00	-.0268	.0263	.0252

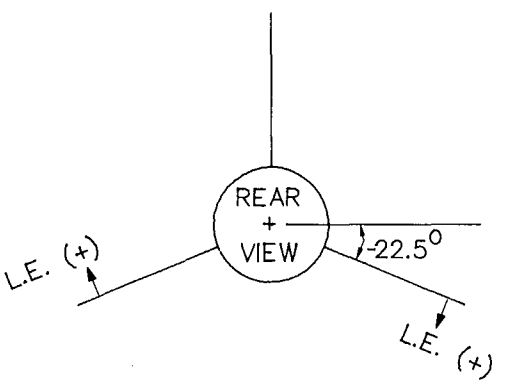


TABLE 17.- ROLL-CONTROL CHARACTERISTICS OF MODEL 5

(a) Two surfaces deflected

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.13	.0011	.0002	-.0001
-1.15	.0010	-.0001	.0001
-.15	.0014	-.0004	0.0000
.88	.0012	-.0002	.0001
1.88	.0009	-.0002	.0001
3.87	.0012	-.0006	.0003
5.89	.0010	-.0007	.0005
7.89	.0013	-.0011	.0009
9.88	.0012	-.0011	.0011
11.88	.0012	-.0004	.0014
15.87	-.0006	.0008	.0012
19.87	.0009	.0007	.0008
21.86	.0002	.0010	.0009

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.17	.0250	-.0279	.0117
-1.16	.0245	-.0282	.0117
-.10	.0244	-.0285	.0117
.93	.0251	-.0293	.0118
1.88	.0244	-.0293	.0118
3.90	.0244	-.0298	.0120
5.87	.0248	-.0303	.0123
7.86	.0245	-.0298	.0123
9.92	.0233	-.0284	.0113
11.87	.0210	-.0252	.0103
15.89	.0136	-.0172	.0077
19.90	.0130	-.0159	.0064
21.87	.0120	-.0165	.0065

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.19	.0467	-.0550	.0232
-1.16	.0470	-.0558	.0233
-.15	.0476	-.0570	.0233
.86	.0481	-.0577	.0232
1.88	.0483	-.0585	.0232
3.88	.0477	-.0587	.0233
5.88	.0475	-.0581	.0232
7.86	.0462	-.0564	.0227
9.88	.0432	-.0526	.0208
11.87	.0390	-.0476	.0187
15.89	.0277	-.0349	.0139
19.84	.0244	-.0310	.0121
21.96	.0246	-.0325	.0120

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0014	-.0005	-.0001
-1.31	.0011	-.0004	-.0001
-.30	.0014	-.0004	-.0001
.72	.0014	-.0004	-.0001
1.68	.0014	-.0006	0.0000
3.72	.0014	-.0006	.0001
5.68	.0011	-.0007	.0002
7.68	.0013	-.0009	.0004
9.69	.0014	-.0011	.0005
11.68	.0014	-.0008	.0008
15.71	.0013	-.0004	.0003
19.69	.0013	.0001	0.0000
21.68	.0012	.0002	.0001

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.33	.0171	-.0198	.0087
-1.29	.0172	-.0199	.0087
-.29	.0175	-.0202	.0087
.72	.0178	-.0205	.0087
1.70	.0176	-.0207	.0087
3.71	.0178	-.0213	.0088
5.73	.0181	-.0218	.0090
7.73	.0176	-.0216	.0088
9.70	.0165	-.0199	.0076
11.70	.0130	-.0160	.0065
15.71	.0095	-.0107	.0041
19.71	.0096	-.0114	.0037
21.71	.0102	-.0126	.0038

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.36	.0336	-.0394	.0179
-1.35	.0339	-.0398	.0179
-.31	.0341	-.0405	.0179
.71	.0340	-.0409	.0180
1.68	.0342	-.0415	.0179
3.70	.0347	-.0425	.0180
5.68	.0344	-.0428	.0180
7.70	.0340	-.0425	.0171
9.69	.0304	-.0381	.0145
11.70	.0253	-.0317	.0121
15.70	.0169	-.0214	.0080
19.74	.0172	-.0231	.0076
21.72	.0182	-.0245	.0074

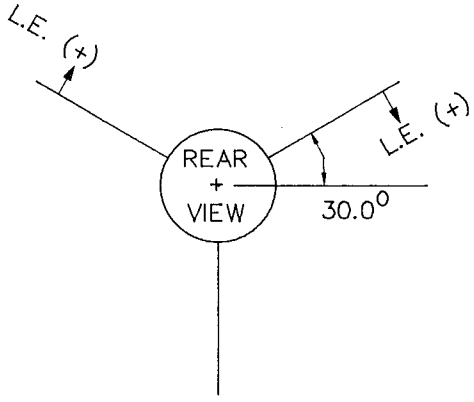


TABLE 17.- Continued

(a) Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.01	.0040	-.0014	.0001
-1.02	.0023	-.0009	0.0000
0.00	0.0000	-.0002	-.0001
1.01	.0013	-.0008	.0002
2.00	.0026	-.0013	.0001
4.01	.0023	-.0011	.0004
6.00	.0032	-.0022	.0004
8.00	.0019	-.0013	.0005
10.00	.0027	-.0013	.0008
11.98	.0024	-.0013	.0007
16.02	.0031	-.0009	.0001
20.02	.0034	-.0014	-.0001
22.05	.0034	-.0018	-.0001

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.03	.0170	-.0185	.0082
-.97	.0175	-.0188	.0078
.01	.0176	-.0191	.0077
1.02	.0167	-.0188	.0078
2.05	.0168	-.0196	.0082
4.05	.0172	-.0197	.0082
6.03	.0169	-.0203	.0082
8.02	.0166	-.0194	.0078
10.05	.0152	-.0174	.0065
12.02	.0096	-.0140	.0051
16.03	.0099	-.0103	.0034
20.04	.0092	-.0130	.0031
22.03	.0082	-.0119	.0030

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.04	.0324	-.0365	.0166
-1.05	.0312	-.0364	.0164
.04	.0325	-.0374	.0162
1.05	.0330	-.0379	.0162
2.03	.0325	-.0384	.0164
4.04	.0333	-.0395	.0166
6.03	.0334	-.0394	.0167
8.03	.0322	-.0382	.0153
9.98	.0274	-.0334	.0129
11.99	.0219	-.0272	.0103
16.02	.0170	-.0193	.0070
20.03	.0213	-.0237	.0065
22.05	.0198	-.0242	.0065

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0011	-.0003	.0001
-1.22	.0006	-.0001	.0001
-.24	.0005	-.0002	.0002
.78	.0004	-.0002	.0001
1.77	.0010	-.0003	.0002
3.78	-.0004	0.0000	.0001
5.79	.0001	-.0001	0.0000
7.77	.0009	-.0002	.0003
9.77	.0015	-.0008	.0005
11.77	.0010	-.0003	.0004
15.78	.0026	-.0003	.0003
19.78	.0027	-.0004	.0002
21.76	.0022	0.0000	.0002

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.26	.0128	-.0143	.0065
-1.22	.0128	-.0144	.0065
-.23	.0131	-.0142	.0063
.80	.0134	-.0143	.0063
1.82	.0122	-.0140	.0061
3.81	.0122	-.0143	.0060
5.75	.0124	-.0149	.0062
7.78	.0133	-.0146	.0061
9.80	.0100	-.0115	.0048
11.77	.0087	-.0096	.0040
15.79	.0078	-.0083	.0030
19.84	.0084	-.0092	.0026
21.83	.0100	-.0103	.0029

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.23	.0254	-.0291	.0138
-1.24	.0242	-.0287	.0135
-.21	.0245	-.0288	.0132
.76	.0243	-.0287	.0131
1.82	.0247	-.0289	.0129
3.80	.0241	-.0291	.0127
5.79	.0241	-.0295	.0128
7.77	.0222	-.0280	.0118
9.75	.0193	-.0244	.0095
11.77	.0158	-.0189	.0075
15.85	.0136	-.0163	.0056
19.79	.0137	-.0171	.0051
21.81	.0153	-.0195	.0055

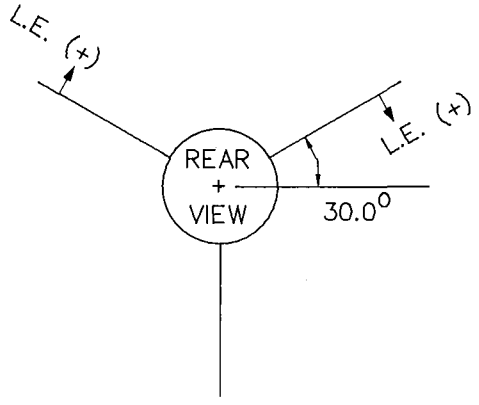


TABLE 17.- Continued

(b) Three surfaces deflected

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.13	.0011	.0002	-.0001
-1.15	.0010	-.0001	.0001
-.15	.0014	-.0004	0.0000
.88	.0012	-.0002	.0001
1.88	.0009	-.0002	.0001
3.87	.0012	-.0006	.0003
5.89	.0010	-.0007	.0005
7.89	.0013	-.0011	.0009
9.88	.0012	-.0011	.0011
11.88	.0012	-.0004	.0014
15.87	-.0006	.0008	.0012
19.87	.0009	.0007	.0008
21.86	.0002	.0010	.0009

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.13	.0016	0.0000	.0342
-1.14	.0020	-.0007	.0344
-.12	.0023	-.0014	.0345
.86	.0023	-.0016	.0346
1.89	.0021	-.0016	.0346
3.86	.0014	-.0010	.0352
5.86	-.0017	.0017	.0352
7.87	-.0023	.0035	.0350
9.90	-.0065	.0086	.0333
11.88	-.0118	.0150	.0315
15.87	-.0247	.0296	.0271
19.87	-.0308	.0366	.0251
21.89	-.0324	.0377	.0253

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0014	-.0005	-.0001
-1.31	.0011	-.0004	-.0001
-.30	.0014	-.0004	-.0001
.72	.0014	-.0004	-.0001
1.68	.0014	-.0006	0.0000
3.72	.0014	-.0006	.0001
5.68	.0011	-.0007	.0002
7.68	.0013	-.0009	.0004
9.69	.0014	-.0011	.0005
11.68	.0014	-.0008	.0008
15.71	.0013	-.0004	.0003
19.69	.0013	.0001	0.0000
21.68	.0012	.0002	.0001

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.30	.0016	.0002	.0267
-1.30	.0014	.0003	.0269
-.28	.0013	.0003	.0272
.70	.0008	.0006	.0273
1.69	.0002	.0009	.0276
3.71	-.0008	.0016	.0282
5.69	-.0027	.0033	.0285
7.69	-.0050	.0063	.0281
9.67	-.0105	.0130	.0262
11.71	-.0173	.0215	.0242
15.70	-.0290	.0368	.0212
19.72	-.0347	.0421	.0217
21.68	-.0357	.0428	.0225

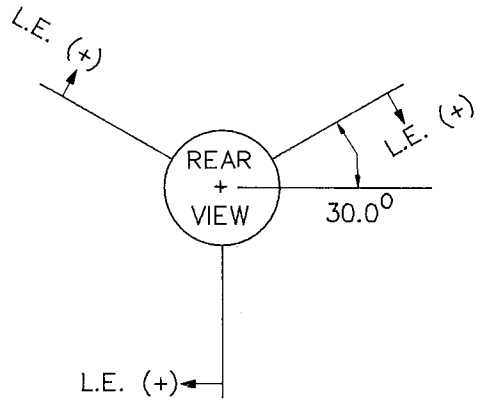


TABLE 17.- Concluded

(b) Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.01	.0040	-.0014	.0001
-1.02	.0023	-.0009	0.0000
0.00	0.0000	-.0002	-.0001
1.01	.0013	-.0008	.0002
2.00	.0026	-.0013	.0001
4.01	.0023	-.0011	.0004
6.00	.0032	-.0022	.0004
8.00	.0019	-.0013	.0005
10.00	.0027	-.0013	.0008
11.98	.0024	-.0013	.0007
16.02	.0031	-.0009	.0001
20.02	.0034	-.0014	-.0001
22.05	.0034	-.0018	-.0001

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0011	-.0003	.0001
-1.22	.0006	-.0001	.0001
-.24	.0005	-.0002	.0002
.78	.0004	-.0002	.0001
1.77	.0010	-.0003	.0002
3.78	-.0004	0.0000	.0001
5.79	.0001	-.0001	0.0000
7.77	.0009	-.0002	.0003
9.77	.0015	-.0008	.0005
11.77	.0010	-.0003	.0004
15.78	.0026	-.0003	.0003
19.78	.0027	-.0004	.0002
21.76	.0022	0.0000	.0002

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.01	.0022	-.0002	.0249
-1.03	.0015	.0005	.0244
.02	.0015	.0003	.0252
.99	.0005	.0009	.0250
2.03	.0008	.0010	.0255
4.03	-.0009	.0022	.0260
6.02	-.0034	.0045	.0262
8.02	-.0045	.0078	.0257
9.96	-.0121	.0146	.0240
12.05	-.0196	.0250	.0220
15.98	-.0298	.0375	.0199
20.01	-.0367	.0426	.0210
22.02	-.0372	.0444	.0220

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.22	.0019	.0004	.0205
-1.23	.0004	.0013	.0202
-.23	-.0006	.0021	.0203
.79	-.0012	.0029	.0203
1.79	-.0024	.0039	.0204
3.81	-.0041	.0057	.0208
5.79	-.0054	.0073	.0213
7.79	-.0086	.0112	.0209
9.80	-.0149	.0188	.0192
11.78	-.0208	.0270	.0181
15.77	-.0299	.0378	.0179
19.79	-.0349	.0453	.0196
21.80	-.0403	.0491	.0210

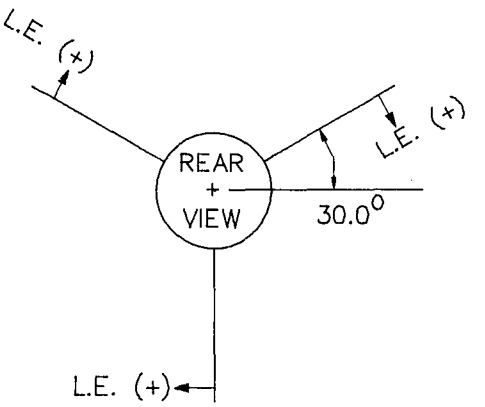


TABLE 18.- ROLL-CONTROL CHARACTERISTICS OF MODEL 6

(a) Two surfaces deflected

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0010	-.0001	-.0001
-1.29	.0011	-.0002	-.0002
-.26	.0008	-.0002	-.0001
.73	.0005	-.0002	0.0000
1.74	.0012	-.0006	0.0000
3.74	.0006	-.0005	0.0000
5.74	.0004	-.0002	.0001
7.74	.0004	-.0001	.0002
9.74	0.0000	.0002	.0003
11.75	-.0002	.0007	.0005
15.73	-.0007	.0016	.0005
19.73	-.0021	.0028	.0004
21.76	-.0032	.0024	.0007

M = 1.70, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.32	-.0211	.0278	.0117
-1.25	-.0217	.0279	.0116
-.33	-.0211	.0270	.0117
.75	-.0213	.0266	.0118
1.78	-.0209	.0263	.0119
3.77	-.0211	.0256	.0120
5.71	-.0206	.0246	.0121
7.76	-.0197	.0237	.0124
9.75	-.0205	.0237	.0121
11.77	-.0206	.0231	.0119
15.75	-.0197	.0221	.0120
19.75	-.0193	.0207	.0122
21.80	-.0198	.0191	.0119

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.22	-.0438	.0562	.0231
-1.29	-.0435	.0555	.0232
-.26	-.0439	.0554	.0233
.77	-.0433	.0544	.0234
1.73	-.0427	.0534	.0234
3.75	-.0427	.0521	.0232
5.78	-.0416	.0500	.0232
7.75	-.0403	.0479	.0233
9.72	-.0402	.0467	.0231
11.73	-.0394	.0457	.0230
15.73	-.0367	.0419	.0230
19.79	-.0346	.0367	.0222
21.77	-.0337	.0329	.0217

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.14	.0012	-.0005	0.0000
-1.15	.0009	-.0005	0.0000
-.14	.0010	-.0006	0.0000
.86	.0009	-.0005	0.0000
1.85	.0013	-.0006	0.0000
3.86	.0010	-.0005	.0001
5.85	.0005	-.0002	.0001
7.87	.0003	0.0000	.0003
9.87	.0001	.0003	.0003
11.87	-.0002	.0004	.0002
15.86	.0005	.0011	.0003
19.86	-.0004	.0015	.0002
21.87	0.0000	.0014	.0002

M = 2.16, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.14	-.0145	.0196	.0085
-1.14	-.0147	.0194	.0087
-.15	-.0147	.0192	.0087
.86	-.0143	.0190	.0088
1.92	-.0146	.0189	.0088
3.88	-.0146	.0186	.0090
5.84	-.0152	.0187	.0093
7.90	-.0155	.0190	.0097
9.90	-.0161	.0194	.0101
11.85	-.0167	.0200	.0104
15.90	-.0167	.0199	.0112
19.92	-.0183	.0206	.0122
21.77	-.0188	.0209	.0125

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.18	-.0311	.0403	.0178
-1.16	-.0310	.0399	.0178
-.16	-.0311	.0394	.0179
.86	-.0309	.0389	.0180
1.89	-.0308	.0384	.0180
3.90	-.0309	.0378	.0182
5.88	-.0318	.0375	.0185
7.86	-.0319	.0372	.0189
9.89	-.0324	.0377	.0196
11.89	-.0326	.0381	.0202
15.90	-.0325	.0375	.0215
19.87	-.0351	.0389	.0235
21.89	-.0361	.0399	.0243

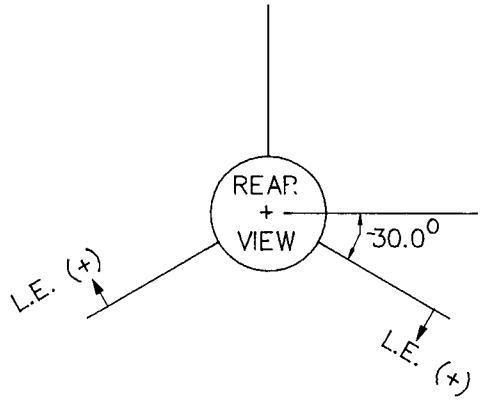


TABLE 18.- Continued

(a) Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-1.78	.0036	-.0016	-.0001
-.81	.0023	-.0012	0.0000
.22	.0028	-.0011	.0001
1.23	.0018	-.0011	.0001
2.24	.0017	-.0008	.0003
4.24	.0023	-.0010	.0003
6.23	.0015	-.0009	.0003
8.23	.0022	-.0004	.0006
10.23	.0018	.0001	.0006
12.28	.0020	.0004	.0005
16.22	.0018	.0008	.0004
20.20	.0005	0.0000	.0004
22.24	-.0005	.0006	.0005

M = 2.36, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-1.80	-.0097	.0162	.0078
-.76	-.0112	.0163	.0077
.21	-.0110	.0163	.0077
1.26	-.0133	.0167	.0077
2.23	-.0105	.0160	.0082
4.20	-.0127	.0165	.0083
6.28	-.0116	.0166	.0091
8.23	-.0126	.0169	.0093
10.20	-.0142	.0184	.0100
12.19	-.0147	.0188	.0103
16.22	-.0155	.0193	.0115
20.27	-.0167	.0207	.0126
22.27	-.0184	.0216	.0132

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-1.82	-.0264	.0354	.0162
-.83	-.0270	.0351	.0161
.22	-.0252	.0343	.0162
1.23	-.0264	.0343	.0164
2.23	-.0254	.0337	.0165
4.25	-.0268	.0341	.0171
6.24	-.0277	.0342	.0178
8.29	-.0280	.0345	.0186
10.25	-.0305	.0358	.0194
12.24	-.0297	.0370	.0201
16.28	-.0311	.0380	.0221
20.21	-.0358	.0398	.0241
22.23	-.0362	.0404	.0253

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.04	.0013	-.0007	.0002
-1.04	.0008	-.0005	.0002
-.04	.0017	-.0007	.0002
.97	.0012	-.0005	.0003
1.97	.0014	-.0005	.0003
3.99	.0015	-.0005	.0004
5.97	.0011	-.0004	.0003
7.98	.0010	-.0003	.0002
9.98	.0003	0.0000	.0003
11.96	.0021	.0009	.0005
15.99	.0009	0.0000	.0004
19.98	.0006	.0002	.0004
21.99	-.0001	.0005	.0003

M = 2.86, δ_r = 5°			
α,deg	C_Y	C_n	C_l
-2.04	-.0096	.0128	.0061
-1.04	-.0098	.0129	.0062
-.05	-.0091	.0131	.0065
.95	-.0090	.0132	.0066
2.03	-.0104	.0135	.0067
3.97	-.0107	.0140	.0072
5.99	-.0113	.0144	.0076
7.98	-.0122	.0154	.0084
9.98	-.0144	.0162	.0089
11.97	-.0137	.0173	.0098
15.96	-.0145	.0201	.0113
19.97	-.0180	.0221	.0132
21.96	-.0200	.0231	.0141

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.09	-.0205	.0276	.0129
-1.03	-.0216	.0277	.0130
-.07	-.0218	.0277	.0131
1.00	-.0217	.0279	.0135
1.97	-.0223	.0282	.0139
3.93	-.0230	.0290	.0147
5.99	-.0242	.0300	.0157
7.98	-.0257	.0315	.0168
9.95	-.0276	.0328	.0180
11.97	-.0286	.0345	.0194
15.97	-.0317	.0386	.0223
19.96	-.0365	.0424	.0251
21.99	-.0405	.0443	.0272

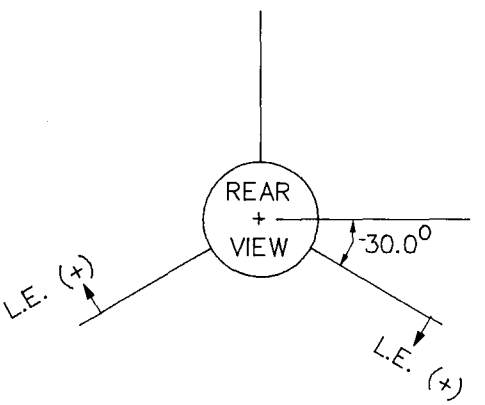


TABLE 18.- Continued

(b) Three surfaces deflected

M = 1.70, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0010	-.0001	-.0001
-1.29	.0011	-.0002	-.0002
-.26	.0008	-.0002	-.0001
.73	.0005	-.0002	0.0000
1.74	.0012	-.0006	0.0000
3.74	.0006	-.0005	0.0000
5.74	.0004	-.0002	.0001
7.74	.0004	-.0001	.0002
9.74	0.0000	.0002	.0003
11.75	-.0002	.0007	.0005
15.73	-.0007	.0016	.0005
19.73	-.0021	.0028	.0004
21.76	-.0032	.0024	.0007

M = 2.16, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.14	.0012	-.0005	0.0000
-1.15	.0009	-.0005	0.0000
-.14	.0010	-.0006	0.0000
.86	.0009	-.0005	0.0000
1.85	.0013	-.0006	0.0000
3.86	.0010	-.0005	.0001
5.85	.0005	-.0002	.0001
7.87	.0003	0.0000	.0003
9.87	.0001	.0003	.0003
11.87	-.0002	.0004	.0002
15.86	.0005	.0011	.0003
19.86	-.0004	.0015	.0002
21.87	0.0000	.0014	.0002

M = 1.70, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.24	.0024	-.0007	.0347
-1.27	.0019	-.0003	.0345
-.26	.0012	-.0001	.0346
.78	.0013	-.0006	.0345
1.75	.0014	-.0010	.0345
3.78	.0022	-.0028	.0342
5.76	.0033	-.0048	.0343
7.73	.0032	-.0057	.0342
9.75	.0031	-.0061	.0339
11.75	.0030	-.0062	.0335
15.75	.0024	-.0070	.0327
19.73	.0016	-.0088	.0313
21.75	-.0007	-.0073	.0298

M = 2.16, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.12	.0038	-.0029	.0276
-1.14	.0032	-.0026	.0274
-.11	.0030	-.0023	.0273
.89	.0025	-.0021	.0271
1.89	.0022	-.0019	.0270
3.87	.0017	-.0021	.0270
5.87	.0010	-.0016	.0272
7.87	-.0005	-.0006	.0273
9.88	-.0025	.0015	.0277
11.86	-.0043	.0034	.0280
15.86	-.0040	.0032	.0290
19.90	-.0120	.0106	.0292
21.88	-.0169	.0166	.0290

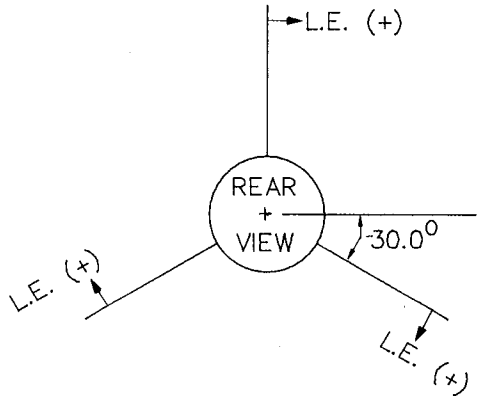


TABLE 18.- Concluded

(b) Concluded

M = 2.36, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-1.78	.0036	-.0016	-.0001
-.81	.0023	-.0012	0.0000
.22	.0028	-.0011	.0001
1.23	.0018	-.0011	.0001
2.24	.0017	-.0008	.0003
4.24	.0023	-.0010	.0003
6.23	.0015	-.0009	.0003
8.23	.0022	-.0004	.0006
10.23	.0018	.0001	.0006
12.28	.0020	.0004	.0005
16.22	.0018	.0008	.0004
20.20	.0005	0.0000	.0004
22.24	-.0005	.0006	.0005

M = 2.36, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-1.80	.0055	-.0043	.0253
-.79	.0053	-.0043	.0249
.27	.0050	-.0035	.0248
1.22	.0032	-.0027	.0250
2.24	.0028	-.0023	.0247
4.25	.0020	-.0015	.0253
6.25	.0008	-.0006	.0256
8.25	-.0018	.0012	.0261
10.22	-.0009	.0031	.0268
12.28	-.0047	.0053	.0273
16.25	-.0057	.0080	.0286
20.24	-.0161	.0168	.0291
22.26	-.0218	.0226	.0293

M = 2.86, δ_r = 0°			
α,deg	C_Y	C_n	C_l
-2.04	.0013	-.0007	.0002
-1.04	.0008	-.0005	.0002
-.04	.0017	-.0007	.0002
.97	.0012	-.0005	.0003
1.97	.0014	-.0005	.0003
3.99	.0015	-.0005	.0004
5.97	.0011	-.0004	.0003
7.98	.0010	-.0003	.0002
9.98	.0003	0.0000	.0003
11.96	.0021	.0009	.0005
15.99	.0009	0.0000	.0004
19.98	.0006	.0002	.0004
21.99	-.0001	.0005	.0003

M = 2.86, δ_r = 10°			
α,deg	C_Y	C_n	C_l
-2.04	.0051	-.0049	.0203
-1.04	.0043	-.0039	.0205
-.02	.0032	-.0030	.0204
.98	.0024	-.0020	.0204
1.98	.0010	-.0009	.0205
3.98	-.0003	.0007	.0211
5.98	-.0018	.0025	.0219
7.96	-.0046	.0050	.0226
9.99	-.0064	.0084	.0238
11.99	-.0082	.0099	.0249
15.96	-.0156	.0168	.0269
19.98	-.0239	.0274	.0288
21.98	-.0301	.0320	.0298

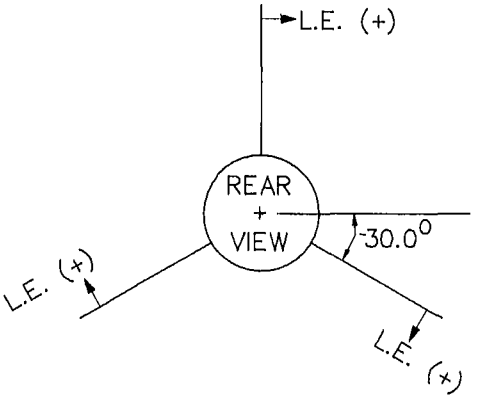


TABLE 19.- YAW-CONTROL CHARACTERISTICS OF MODEL 1 WITH ONE SURFACE DEFLECTED

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-1.97	.0015	-.0007	-.0001
-.96	.0013	-.0007	-.0001
.04	.0013	-.0007	-.0001
1.04	.0017	-.0008	-.0002
2.04	.0013	-.0007	-.0002
4.03	.0013	-.0006	0.0000
6.03	.0007	-.0002	.0001
8.03	.0001	-.0003	.0003
10.01	.0006	-.0003	.0004
12.02	-.0004	.0002	.0005
15.98	-.0005	.0003	.0007
20.01	-.0003	.0003	.0002
22.04	-.0022	.0003	.0003

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.21	.0010	-.0005	-.0001
-1.23	.0009	-.0004	-.0001
-.23	.0010	-.0005	-.0001
.82	.0008	-.0004	0.0000
1.78	.0006	-.0003	-.0001
3.79	.0005	-.0003	0.0000
5.79	-.0001	.0001	.0002
7.79	-.0002	0.0000	.0002
9.78	-.0008	0.0000	.0002
11.78	-.0009	.0002	.0002
15.80	-.0003	-.0003	.0001
19.82	-.0002	-.0005	-.0002
21.78	.0001	-.0010	-.0002

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.00	-.0415	.0522	.0104
-1.05	-.0415	.0524	.0104
.01	-.0420	.0530	.0105
.99	-.0428	.0535	.0106
1.98	-.0435	.0542	.0106
3.99	-.0448	.0556	.0110
6.01	-.0462	.0572	.0114
8.01	-.0479	.0585	.0115
10.00	-.0491	.0604	.0115
11.99	-.0513	.0622	.0115
15.99	-.0549	.0663	.0113
20.00	-.0587	.0692	.0113
22.01	-.0617	.0717	.0117

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.23	-.0295	.0374	.0083
-1.23	-.0301	.0380	.0085
-.22	-.0306	.0387	.0086
.78	-.0314	.0396	.0088
1.79	-.0323	.0406	.0090
3.77	-.0344	.0427	.0095
5.78	-.0360	.0449	.0101
7.77	-.0379	.0471	.0105
9.79	-.0403	.0496	.0110
11.78	-.0432	.0521	.0115
15.78	-.0480	.0580	.0123
19.79	-.0534	.0639	.0128
21.78	-.0557	.0665	.0130

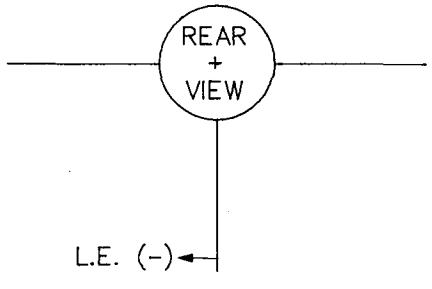


TABLE 19.- Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-1.90	.0020	-.0008	0.0000
-.84	.0023	-.0011	-.0001
.22	.0020	-.0012	0.0000
1.18	.0024	-.0011	.0001
2.17	.0020	-.0009	-.0001
4.19	.0010	-.0012	.0001
6.19	.0027	-.0012	.0004
8.18	.0015	-.0011	.0003
10.15	.0010	-.0012	.0002
12.16	-.0002	-.0017	-.0001
16.13	.0016	-.0013	.0002
20.16	.0024	-.0022	0.0000
22.15	.0040	-.0030	.0001

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.12	.0017	-.0004	-.0001
-1.10	.0009	-.0006	.0001
-.11	.0005	-.0004	0.0000
.93	.0004	-.0005	0.0000
1.92	.0007	-.0004	.0002
3.92	.0008	-.0005	.0003
5.92	.0004	-.0004	.0001
7.89	.0005	-.0003	.0002
9.91	.0009	.0003	.0001
11.90	-.0002	-.0005	.0001
15.91	.0020	.0002	.0001
19.94	.0020	-.0007	.0002
21.91	.0017	-.0022	.0003

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
.12	-.0276	.0351	.0080
1.17	-.0279	.0359	.0084
2.15	-.0284	.0367	.0087
4.15	-.0313	.0388	.0091
6.17	-.0325	.0407	.0096
8.17	-.0343	.0436	.0101
10.15	-.0362	.0454	.0105
12.13	-.0395	.0492	.0111
16.13	-.0441	.0549	.0123
20.15	-.0513	.0617	.0134
22.16	-.0561	.0667	.0141

M = 2.86, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.09	-.0207	.0266	.0063
-1.08	-.0209	.0272	.0062
-.06	-.0215	.0280	.0064
.90	-.0228	.0288	.0067
1.91	-.0228	.0296	.0070
3.90	-.0251	.0315	.0075
5.91	-.0269	.0336	.0081
7.92	-.0284	.0361	.0086
9.92	-.0313	.0387	.0092
11.91	-.0327	.0423	.0098
15.90	-.0389	.0487	.0113
19.91	-.0441	.0566	.0135
21.91	-.0505	.0619	.0143

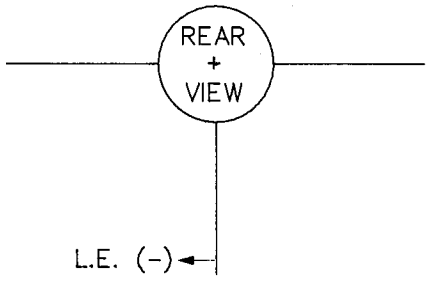


TABLE 20.- YAW-CONTROL CHARACTERISTICS OF MODEL 2 WITH ONE SURFACE DEFLECTED

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.29	.0014	-.0002	.0002
-1.28	.0010	-.0002	.0001
-.32	.0012	-.0003	.0002
.72	.0009	-.0001	.0003
1.70	.0006	0.0000	.0003
3.72	.0005	-.0001	.0004
5.71	0.0000	.0001	.0006
7.70	-.0003	.0001	.0006
9.73	.0002	-.0001	.0009
11.69	-.0004	.0002	.0010
15.70	-.0013	.0005	.0011
19.68	-.0027	.0014	.0010
21.73	-.0044	.0019	.0013

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.33	-.0447	.0551	-.0107
-1.29	-.0444	.0543	-.0106
-.27	-.0438	.0537	-.0105
.73	-.0433	.0532	-.0102
1.73	-.0432	.0528	-.0103
3.72	-.0429	.0523	-.0100
5.71	-.0429	.0524	-.0098
7.71	-.0429	.0518	-.0097
9.71	-.0424	.0509	-.0095
11.67	-.0416	.0498	-.0090
15.69	-.0400	.0473	-.0083
19.70	-.0387	.0437	-.0074
21.74	-.0359	.0400	-.0064

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0009	-.0001	.0002
-1.26	.0008	-.0002	.0002
-.23	.0009	-.0001	.0002
.75	.0005	0.0000	.0002
1.75	.0005	.0001	.0003
3.79	.0003	.0002	.0004
5.77	0.0000	.0003	.0005
7.77	-.0005	.0002	.0005
9.76	-.0009	.0002	.0005
11.76	-.0011	.0002	.0005
15.75	-.0012	.0008	.0005
19.76	-.0013	.0006	.0004
21.78	-.0014	.0009	.0004

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.27	-.0337	.0418	-.0091
-1.24	-.0332	.0410	-.0088
-.23	-.0326	.0402	-.0086
.77	-.0319	.0396	-.0083
1.79	-.0315	.0390	-.0082
3.74	-.0313	.0383	-.0079
5.74	-.0312	.0378	-.0077
7.78	-.0303	.0367	-.0074
9.77	-.0295	.0352	-.0072
11.76	-.0286	.0338	-.0069
15.77	-.0281	.0332	-.0065
19.76	-.0229	.0266	-.0050
21.76	-.0186	.0215	-.0040

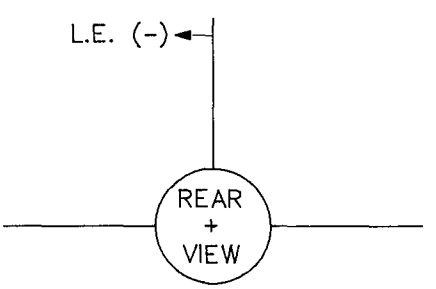


TABLE 20.- Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.06	.0014	-.0001	.0006
-1.12	.0015	-.0001	.0004
-.07	.0014	0.0000	.0005
.93	.0010	.0001	.0004
1.95	.0011	.0003	.0006
3.91	.0001	0.0000	.0005
5.98	.0005	.0002	.0009
7.94	-.0003	.0004	.0007
9.98	-.0002	.0006	.0009
11.93	-.0007	.0001	.0004
15.93	.0008	.0016	.0011
19.98	.0001	0.0000	.0007
21.93	-.0008	.0002	.0006

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.20	.0016	-.0003	.0002
-1.24	.0012	-.0004	.0002
-.18	.0012	-.0001	.0003
.84	.0009	-.0001	.0003
1.80	.0005	0.0000	.0003
3.84	.0006	.0001	.0004
5.82	-.0002	.0001	.0003
7.82	-.0001	.0002	.0004
9.79	-.0001	.0003	.0004
11.80	-.0002	.0007	.0004
15.84	.0006	.0007	.0007
19.80	0.0000	.0006	.0007
21.78	-.0003	.0009	.0005

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.05	-.0299	.0383	-.0079
-1.08	-.0293	.0369	-.0080
-.08	-.0287	.0366	-.0075
.97	-.0276	.0361	-.0072
1.98	-.0281	.0355	-.0071
3.93	-.0276	.0342	-.0070
5.93	-.0267	.0331	-.0066
8.01	-.0251	.0320	-.0059
9.96	-.0250	.0310	-.0061
11.93	-.0247	.0296	-.0060
15.98	-.0229	.0285	-.0050
19.97	-.0164	.0212	-.0037
21.95	-.0138	.0168	-.0028

M = 2.86, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.22	-.0244	.0306	-.0070
-1.20	-.0246	.0297	-.0069
-.15	-.0232	.0291	-.0063
.82	-.0223	.0283	-.0062
1.82	-.0219	.0278	-.0060
3.82	-.0216	.0265	-.0058
5.84	-.0202	.0259	-.0052
7.79	-.0196	.0251	-.0050
9.76	-.0198	.0237	-.0050
11.80	-.0198	.0234	-.0051
15.82	-.0168	.0203	-.0038
19.81	-.0115	.0155	-.0024
21.82	-.0086	.0123	-.0016

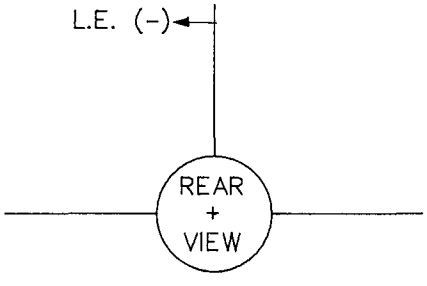


TABLE 21.- YAW-CONTROL CHARACTERISTICS OF MODEL 3 WITH ONE SURFACE DEFLECTED

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.20	.0009	0.0000	.0005
-1.19	.0010	-.0002	.0005
-.16	.0003	0.0000	.0006
.82	.0009	-.0002	.0005
1.83	.0011	-.0004	.0005
3.84	.0007	-.0004	.0008
5.82	.0014	-.0012	.0009
7.81	.0011	-.0011	.0010
9.84	0.0000	-.0005	.0010
11.84	-.0003	-.0005	.0008
15.82	-.0010	-.0003	.0010
19.80	-.0021	-.0007	.0015
21.85	-.0036	-.0006	.0014

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.19	-.0420	.0531	.0114
-1.11	-.0426	.0536	.0116
-.14	-.0424	.0537	.0117
.90	-.0433	.0547	.0117
1.84	-.0440	.0553	.0120
3.86	-.0452	.0565	.0123
5.92	-.0458	.0572	.0128
7.91	-.0464	.0581	.0132
9.88	-.0478	.0593	.0132
11.89	-.0493	.0614	.0133
15.91	-.0527	.0649	.0138
19.88	-.0551	.0685	.0140
21.92	-.0573	.0695	.0138

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0009	-.0001	.0003
-1.24	.0007	.0001	.0003
-.21	.0005	.0001	.0002
.79	.0009	.0001	.0002
1.79	.0004	.0002	.0002
3.77	.0002	.0003	.0003
5.80	.0006	0.0000	.0004
7.79	.0002	-.0001	.0006
9.76	0.0000	-.0003	.0006
11.78	-.0004	-.0003	.0005
15.77	-.0006	0.0000	.0004
19.78	-.0012	-.0002	.0003
21.81	-.0014	-.0004	.0004

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.34	-.0302	.0386	.0090
-1.31	-.0307	.0392	.0092
-.30	-.0314	.0400	.0094
.70	-.0323	.0408	.0096
1.74	-.0328	.0416	.0098
3.68	-.0343	.0433	.0103
5.73	-.0359	.0451	.0109
7.72	-.0375	.0470	.0114
9.76	-.0394	.0494	.0120
11.70	-.0417	.0520	.0123
15.72	-.0458	.0576	.0132
19.76	-.0518	.0646	.0142
21.72	-.0544	.0673	.0144

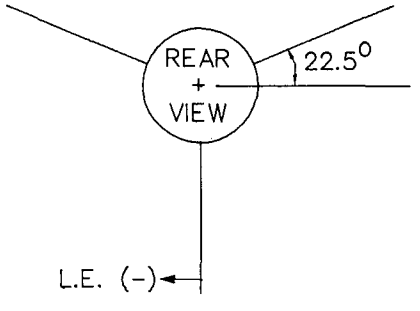


TABLE 21.- Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.01	.0032	-.0010	.0003
-1.01	.0029	-.0010	.0004
0.00	.0023	-.0010	.0003
.97	.0009	-.0007	.0003
1.96	.0017	-.0007	.0003
3.95	.0013	-.0006	.0005
5.96	.0028	-.0016	.0006
7.98	.0040	-.0020	.0009
9.95	-.0002	-.0004	.0005
11.96	.0003	-.0009	.0004
15.98	.0014	-.0016	.0003
19.96	-.0011	-.0006	.0002
21.97	.0012	-.0016	.0002

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.13	-.0263	.0346	.0081
-1.05	-.0264	.0351	.0084
-.07	-.0290	.0364	.0086
.97	-.0278	.0364	.0089
1.97	-.0290	.0374	.0094
3.98	-.0318	.0400	.0099
6.02	-.0331	.0421	.0105
8.02	-.0332	.0431	.0111
10.03	-.0359	.0459	.0114
12.03	-.0384	.0484	.0119
16.01	-.0445	.0563	.0129
19.97	-.0507	.0624	.0144
22.02	-.0506	.0656	.0151

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.48	.0008	-.0002	.0002
-1.49	.0005	-.0003	.0002
-.47	0.0000	0.0000	.0002
.55	.0007	-.0002	.0003
1.53	.0006	-.0003	.0004
3.55	.0006	-.0005	.0003
5.54	.0012	-.0005	.0004
7.55	.0006	-.0005	.0005
9.52	.0004	-.0004	.0003
11.51	.0004	-.0003	.0002
15.55	.0006	.0001	.0002
19.53	-.0011	-.0005	.0002
21.54	-.0006	-.0011	.0003

M = 2.86, δ_n = -10			
α,deg	C_Y	C_n	C_l
-2.37	-.0219	.0282	.0068
-1.29	-.0224	.0289	.0071
-.27	-.0241	.0299	.0072
.73	-.0237	.0305	.0074
1.73	-.0250	.0314	.0076
3.70	-.0266	.0334	.0083
5.72	-.0279	.0354	.0089
7.72	-.0299	.0381	.0095
9.73	-.0330	.0413	.0101
11.75	-.0345	.0446	.0108
15.70	-.0396	.0521	.0125
19.74	-.0494	.0611	.0144
21.72	-.0511	.0649	.0156

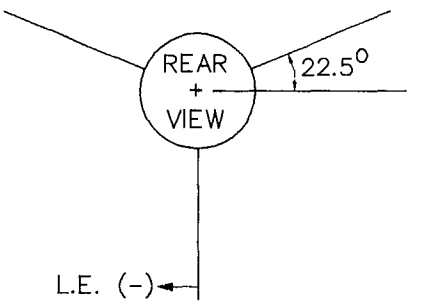


TABLE 22.- YAW-CONTROL CHARACTERISTICS OF MODEL 5

(a) Three surfaces deflected (equally)

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.13	.0011	.0002	-.0001
-1.15	.0010	-.0001	.0001
-.15	.0014	-.0004	0.0000
.88	.0012	-.0002	.0001
1.88	.0009	-.0002	.0001
3.87	.0012	-.0006	.0003
5.89	.0010	-.0007	.0005
7.89	.0013	-.0011	.0009
9.88	.0012	-.0011	.0011
11.88	.0012	-.0004	.0014
15.87	-.0006	.0008	.0012
19.87	.0009	.0007	.0008
21.86	.0002	.0010	.0009

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.16	-.0875	.1079	-.0121
-1.13	-.0881	.1091	-.0119
-.13	-.0892	.1105	-.0119
.88	-.0900	.1117	-.0116
1.84	-.0907	.1125	-.0114
3.89	-.0920	.1143	-.0109
5.85	-.0919	.1145	-.0101
7.88	-.0910	.1131	-.0087
9.87	-.0895	.1113	-.0067
11.89	-.0861	.1075	-.0039
15.86	-.0801	.1004	.0010
19.88	-.0781	.0996	.0030
21.89	-.0812	.1031	.0032

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0014	-.0005	-.0001
-1.31	.0011	-.0004	-.0001
-.30	.0014	-.0004	-.0001
.72	.0014	-.0004	-.0001
1.68	.0014	-.0006	0.0000
3.72	.0014	-.0006	.0001
5.68	.0011	-.0007	.0002
7.68	.0013	-.0009	.0004
9.69	.0014	-.0011	.0005
11.68	.0014	-.0008	.0008
15.71	.0013	-.0004	.0003
19.69	.0013	.0001	0.0000
21.68	.0012	.0002	.0001

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.32	-.0621	.0766	-.0093
-1.30	-.0627	.0777	-.0090
-.29	-.0633	.0787	-.0089
.72	-.0644	.0802	-.0086
1.69	-.0657	.0816	-.0085
3.71	-.0672	.0842	-.0079
5.72	-.0692	.0868	-.0073
7.70	-.0689	.0870	-.0054
9.69	-.0675	.0848	-.0022
11.70	-.0642	.0810	.0009
15.70	-.0610	.0783	.0049
19.71	-.0677	.0870	.0064
21.70	-.0715	.0918	.0066

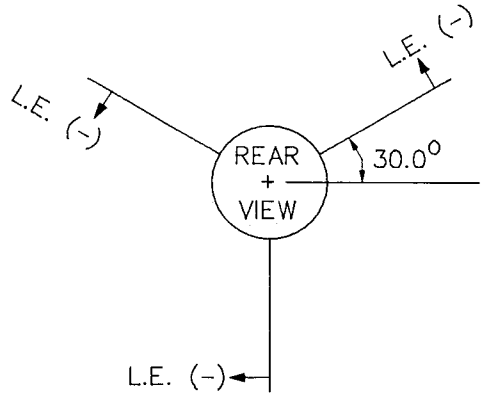


TABLE 22.- Continued

(a) Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.01	.0040	-.0014	.0001
-1.02	.0023	-.0009	0.0000
0.00	0.0000	-.0002	-.0001
1.01	.0013	-.0008	.0002
2.00	.0026	-.0013	.0001
4.01	.0023	-.0011	.0004
6.00	.0032	-.0022	.0004
8.00	.0019	-.0013	.0005
10.00	.0027	-.0013	.0008
11.98	.0024	-.0013	.0007
16.02	.0031	-.0009	.0001
20.02	.0034	-.0014	-.0001
22.05	.0034	-.0018	-.0001

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.24	.0011	-.0003	.0001
-1.22	.0006	-.0001	.0001
-.24	.0005	-.0002	.0002
.78	.0004	-.0002	.0001
1.77	.0010	-.0003	.0002
3.78	-.0004	0.0000	.0001
5.79	.0001	-.0001	0.0000
7.77	.0009	-.0002	.0003
9.77	.0015	-.0008	.0005
11.77	.0010	-.0003	.0004
15.78	.0026	-.0003	.0003
19.78	.0027	-.0004	.0002
21.76	.0022	0.0000	.0002

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-1.99	-.0547	.0689	-.0084
-1.02	-.0554	.0696	-.0079
.01	-.0565	.0708	-.0080
1.02	-.0564	.0717	-.0073
2.01	-.0591	.0740	-.0075
4.02	-.0616	.0770	-.0069
6.03	-.0613	.0784	-.0058
8.03	-.0602	.0779	-.0036
9.98	-.0620	.0785	-.0010
12.01	-.0571	.0738	.0023
16.03	-.0578	.0748	.0058
20.02	-.0642	.0849	.0076
22.01	-.0684	.0899	.0078

M = 2.86, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.21	-.0454	.0564	-.0069
-1.19	-.0459	.0569	-.0064
-.21	-.0462	.0574	-.0060
.81	-.0464	.0582	-.0056
1.81	-.0489	.0597	-.0051
3.80	-.0492	.0616	-.0047
5.79	-.0504	.0640	-.0039
7.77	-.0499	.0642	-.0019
9.78	-.0485	.0628	.0011
11.80	-.0472	.0620	.0037
15.77	-.0505	.0667	.0068
19.81	-.0587	.0775	.0091
21.76	-.0647	.0845	.0098

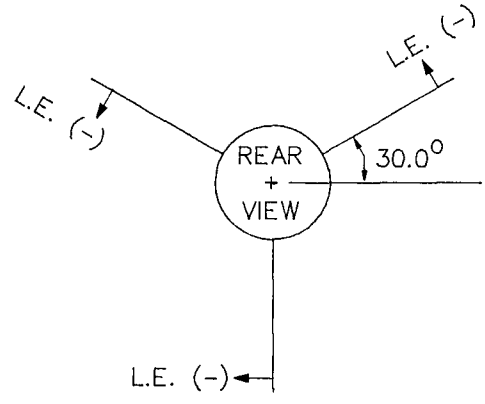


TABLE 22.- Continued

(b) Three surfaces deflected (differentially)

$M = 1.70,\ \delta_{n,V} = 0^0,\ \delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.13	.0011	.0002	-.0001
-1.15	.0010	-.0001	.0001
-.15	.0014	-.0004	0.0000
.88	.0012	-.0002	.0001
1.88	.0009	-.0002	.0001
3.87	.0012	-.0006	.0003
5.89	.0010	-.0007	.0005
7.89	.0013	-.0011	.0009
9.88	.0012	-.0011	.0011
11.88	.0012	-.0004	.0014
15.87	-.0006	.0008	.0012
19.87	.0009	.0007	.0008
21.86	.0002	.0010	.0009
$M = 2.16,\ \delta_{n,V} = 0^0,\ \delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.30	.0014	-.0005	-.0001
-1.31	.0011	-.0004	-.0001
-.30	.0014	-.0004	-.0001
.72	.0014	-.0004	-.0001
1.68	.0014	-.0006	0.0000
3.72	.0014	-.0006	.0001
5.68	.0011	-.0007	.0002
7.68	.0013	-.0009	.0004
9.69	.0014	-.0011	.0005
11.68	.0014	-.0008	.0008
15.71	.0013	-.0004	.0003
19.69	.0013	.0001	0.0000
21.68	.0012	.0002	.0001

$M = 1.70,\ \delta_{n,V} = -10^0,\ \delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.14	-.0651	.0809	-.0007
-1.11	-.0659	.0818	-.0006
-.11	-.0663	.0826	-.0005
.85	-.0676	.0839	-.0003
1.86	-.0684	.0848	-.0001
3.90	-.0693	.0861	.0002
5.90	-.0706	.0872	.0007
7.85	-.0704	.0873	.0016
9.89	-.0697	.0865	.0032
11.89	-.0685	.0850	.0048
15.88	-.0664	.0824	.0072
19.89	-.0661	.0839	.0084
21.89	-.0689	.0870	.0086
$M = 2.16,\ \delta_{n,V} = -10^0,\ \delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.31	-.0463	.0580	-.0002
-1.34	-.0470	.0588	0.0000
-.31	-.0476	.0596	.0002
.68	-.0484	.0608	.0005
1.70	-.0497	.0620	.0007
3.69	-.0513	.0643	.0012
5.71	-.0530	.0666	.0018
7.72	-.0532	.0672	.0034
9.71	-.0538	.0677	.0052
11.72	-.0529	.0668	.0071
15.74	-.0534	.0690	.0092
19.72	-.0593	.0761	.0103
21.73	-.0631	.0801	.0106

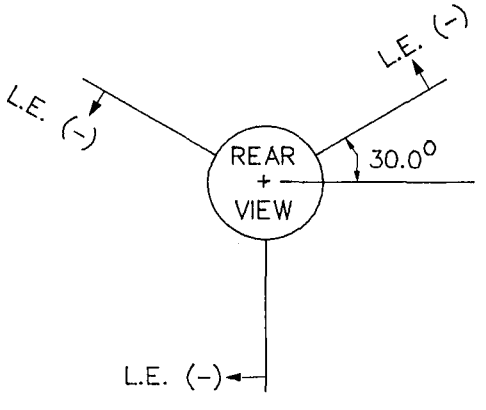


TABLE 22.- Concluded

(b) Concluded

M = 2.36, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.01	.0040	-.0014	.0001
-1.02	.0023	-.0009	0.0000
0.00	0.0000	-.0002	-.0001
1.01	.0013	-.0008	.0002
2.00	.0026	-.0013	.0001
4.01	.0023	-.0011	.0004
6.00	.0032	-.0022	.0004
8.00	.0019	-.0013	.0005
10.00	.0027	-.0013	.0008
11.98	.0024	-.0013	.0007
16.02	.0031	-.0009	.0001
20.02	.0034	-.0014	-.0001
22.05	.0034	-.0018	-.0001

M = 2.86, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.24	.0011	-.0003	.0001
-1.22	.0006	-.0001	.0001
-.24	.0005	-.0002	.0002
.78	.0004	-.0002	.0001
1.77	.0010	-.0003	.0002
3.78	-.0004	0.0000	.0001
5.79	.0001	-.0001	0.0000
7.77	.0009	-.0002	.0003
9.77	.0015	-.0008	.0005
11.77	.0010	-.0003	.0004
15.78	.0026	-.0003	.0003
19.78	.0027	-.0004	.0002
21.76	.0022	0.0000	.0002

M = 2.36, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.09	-.0391	.0510	0.0000
-1.03	-.0393	.0518	.0003
0.00	-.0411	.0531	.0006
1.00	-.0408	.0532	.0012
2.03	-.0437	.0553	.0012
4.01	-.0444	.0571	.0015
6.02	-.0477	.0602	.0023
7.96	-.0480	.0617	.0036
10.01	-.0472	.0616	.0057
12.01	-.0470	.0613	.0074
16.04	-.0478	.0645	.0095
20.07	-.0568	.0738	.0109
22.10	-.0590	.0781	.0113

M = 2.86, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.25	-.0332	.0422	.0002
-1.26	-.0342	.0427	.0005
-.20	-.0336	.0430	.0008
.79	-.0344	.0440	.0013
1.79	-.0350	.0450	.0015
3.77	-.0377	.0472	.0019
5.81	-.0389	.0496	.0026
7.76	-.0405	.0514	.0038
9.81	-.0397	.0521	.0060
11.79	-.0429	.0540	.0072
15.80	-.0456	.0602	.0097
19.78	-.0531	.0695	.0119
21.79	-.0581	.0750	.0128

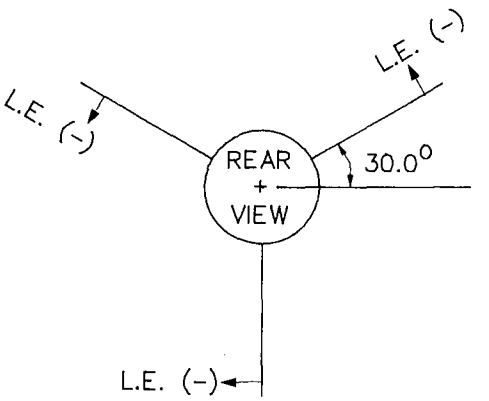


TABLE 23.- YAW-CONTROL CHARACTERISTICS OF MODEL 6

(a) One surface deflected

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0010	-.0001	-.0001
-1.29	.0011	-.0002	-.0002
-.26	.0008	-.0002	-.0001
.73	.0005	-.0002	0.0000
1.74	.0012	-.0006	0.0000
3.74	.0006	-.0005	0.0000
5.74	.0004	-.0002	.0001
7.74	.0004	-.0001	.0002
9.74	0.0000	.0002	.0003
11.75	-.0002	.0007	.0005
15.73	-.0007	.0016	.0005
19.73	-.0021	.0028	.0004
21.76	-.0032	.0024	.0007

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.29	-.0451	.0562	-.0118
-1.29	-.0442	.0551	-.0117
-.28	-.0435	.0544	-.0115
.72	-.0436	.0541	-.0113
1.72	-.0438	.0537	-.0113
3.72	-.0430	.0529	-.0111
5.74	-.0434	.0532	-.0110
7.71	-.0424	.0523	-.0108
9.73	-.0420	.0515	-.0105
11.73	-.0417	.0509	-.0102
15.75	-.0398	.0489	-.0096
19.73	-.0380	.0466	-.0085
21.76	-.0367	.0430	-.0070

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.14	.0012	-.0005	0.0000
-1.15	.0009	-.0005	0.0000
-.14	.0010	-.0006	0.0000
.86	.0009	-.0005	0.0000
1.85	.0013	-.0006	0.0000
3.86	.0010	-.0005	.0001
5.85	.0005	-.0002	.0001
7.87	.0003	0.0000	.0003
9.87	.0001	.0003	.0003
11.87	-.0002	.0004	.0002
15.86	.0005	.0011	.0003
19.86	-.0004	.0015	.0002
21.87	0.0000	.0014	.0002

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.15	-.0345	.0429	-.0098
-1.15	-.0338	.0421	-.0095
-.14	-.0330	.0412	-.0093
.86	-.0326	.0406	-.0091
1.87	-.0322	.0399	-.0091
3.84	-.0317	.0393	-.0087
5.87	-.0311	.0385	-.0085
7.87	-.0304	.0374	-.0083
9.86	-.0296	.0363	-.0079
11.86	-.0283	.0352	-.0076
15.86	-.0276	.0355	-.0073
19.85	-.0225	.0290	-.0057
21.87	-.0185	.0241	-.0047

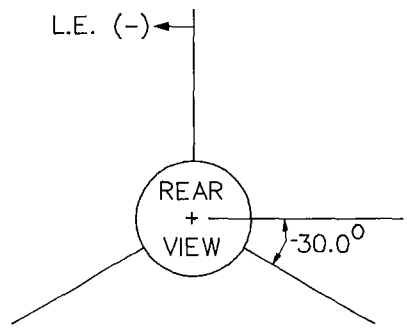


TABLE 23.- Continued

(a) Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-1.78	.0036	-.0016	-.0001
-.81	.0023	-.0012	0.0000
.22	.0028	-.0011	.0001
1.23	.0018	-.0011	.0001
2.24	.0017	-.0008	.0003
4.24	.0023	-.0010	.0003
6.23	.0015	-.0009	.0003
8.23	.0022	-.0004	.0006
10.23	.0018	.0001	.0006
12.28	.0020	.0004	.0005
16.22	.0018	.0008	.0004
20.20	.0005	0.0000	.0004
22.24	-.0005	.0006	.0005

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.04	.0013	-.0007	.0002
-1.04	.0008	-.0005	.0002
-.04	.0017	-.0007	.0002
.97	.0012	-.0005	.0003
1.97	.0014	-.0005	.0003
3.99	.0015	-.0005	.0004
5.97	.0011	-.0004	.0003
7.98	.0010	-.0003	.0002
9.98	.0003	0.0000	.0003
11.96	.0021	.0009	.0005
15.99	.0009	0.0000	.0004
19.98	.0006	.0002	.0004
21.99	-.0001	.0005	.0003

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-1.77	-.0296	.0382	-.0090
-.77	-.0293	.0377	-.0085
.21	-.0292	.0371	-.0084
1.21	-.0282	.0360	-.0082
2.23	-.0281	.0354	-.0080
4.25	-.0270	.0342	-.0078
6.23	-.0263	.0334	-.0074
8.22	-.0257	.0324	-.0072
10.24	-.0248	.0316	-.0067
12.26	-.0231	.0307	-.0065
16.23	-.0225	.0303	-.0060
20.24	-.0153	.0224	-.0046
22.26	-.0132	.0176	-.0034

M = 2.86, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.08	-.0251	.0318	-.0074
-1.05	-.0244	.0309	-.0071
-.05	-.0239	.0297	-.0070
.97	-.0229	.0290	-.0068
1.97	-.0218	.0282	-.0065
3.96	-.0210	.0272	-.0061
5.98	-.0211	.0263	-.0060
7.97	-.0207	.0254	-.0057
9.96	-.0195	.0247	-.0054
11.96	-.0190	.0249	-.0051
15.97	-.0151	.0214	-.0042
19.95	-.0104	.0159	-.0030
21.95	-.0088	.0128	-.0025

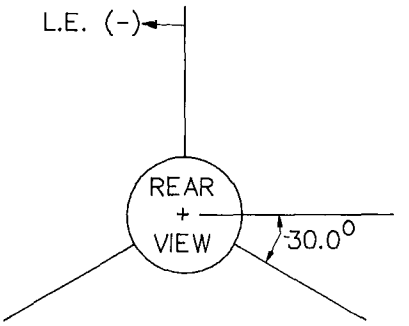


TABLE 23.- Continued

(b) Three surfaces deflected (equally)

M = 1.70, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.30	.0010	-.0001	-.0001
-1.29	.0011	-.0002	-.0002
-.26	.0008	-.0002	-.0001
.73	.0005	-.0002	0.0000
1.74	.0012	-.0006	0.0000
3.74	.0006	-.0005	0.0000
5.74	.0004	-.0002	.0001
7.74	.0004	-.0001	.0002
9.74	0.0000	.0002	.0003
11.75	-.0002	.0007	.0005
15.73	-.0007	.0016	.0005
19.73	-.0021	.0028	.0004
21.76	-.0032	.0024	.0007

M = 1.70, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.27	-.0919	.1147	.0114
-1.29	-.0921	.1140	.0116
-.27	-.0903	.1119	.0117
.73	-.0896	.1107	.0118
1.71	-.0890	.1094	.0120
3.73	-.0882	.1073	.0119
5.72	-.0862	.1046	.0119
7.73	-.0846	.1016	.0118
9.74	-.0824	.0983	.0119
11.73	-.0811	.0962	.0121
15.73	-.0776	.0904	.0125
19.74	-.0717	.0813	.0128
21.75	-.0677	.0743	.0134

M = 2.16, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.14	.0012	-.0005	0.0000
-1.15	.0009	-.0005	0.0000
-.14	.0010	-.0006	0.0000
.86	.0009	-.0005	0.0000
1.85	.0013	-.0006	0.0000
3.86	.0010	-.0005	.0001
5.85	.0005	-.0002	.0001
7.87	.0003	0.0000	.0003
9.87	.0001	.0003	.0003
11.87	-.0002	.0004	.0002
15.86	.0005	.0011	.0003
19.86	-.0004	.0015	.0002
21.87	0.0000	.0014	.0002

M = 2.16, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.15	-.0668	.0837	.0083
-1.14	-.0658	.0824	.0085
-.15	-.0653	.0812	.0088
.85	-.0644	.0799	.0090
1.85	-.0641	.0788	.0092
3.87	-.0631	.0771	.0097
5.85	-.0627	.0760	.0101
7.85	-.0620	.0746	.0107
9.86	-.0617	.0735	.0116
11.88	-.0613	.0723	.0125
15.86	-.0605	.0714	.0142
19.85	-.0576	.0666	.0176
21.85	-.0544	.0621	.0193

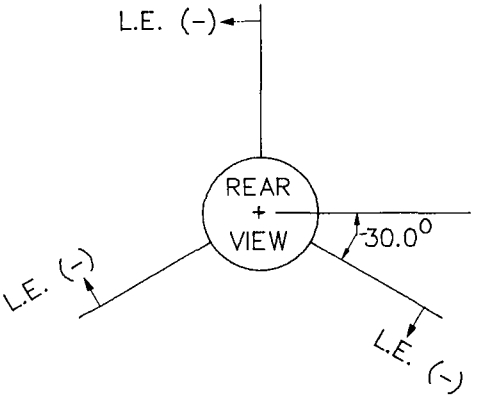


TABLE 23.- Continued

(b) Concluded

M = 2.36, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-1.78	.0036	-.0016	-.0001
-.81	.0023	-.0012	0.0000
.22	.0028	-.0011	.0001
1.23	.0018	-.0011	.0001
2.24	.0017	-.0008	.0003
4.24	.0023	-.0010	.0003
6.23	.0015	-.0009	.0003
8.23	.0022	-.0004	.0006
10.23	.0018	.0001	.0006
12.28	.0020	.0004	.0005
16.22	.0018	.0008	.0004
20.20	.0005	0.0000	.0004
22.24	-.0005	.0006	.0005

M = 2.36, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-1.79	-.0580	.0743	.0072
-.77	-.0580	.0733	.0075
.24	-.0574	.0721	.0078
1.20	-.0574	.0713	.0079
2.24	-.0560	.0701	.0084
4.20	-.0560	.0695	.0094
6.23	-.0561	.0686	.0100
8.20	-.0553	.0676	.0111
10.22	-.0553	.0670	.0121
12.21	-.0553	.0670	.0134
16.21	-.0558	.0677	.0154
20.24	-.0544	.0612	.0193
22.21	-.0507	.0585	.0213

M = 2.86, δ_n = 0°			
α,deg	C_Y	C_n	C_l
-2.04	.0013	-.0007	.0002
-1.04	.0008	-.0005	.0002
-.04	.0017	-.0007	.0002
.97	.0012	-.0005	.0003
1.97	.0014	-.0005	.0003
3.99	.0015	-.0005	.0004
5.97	.0011	-.0004	.0003
7.98	.0010	-.0003	.0002
9.98	.0003	0.0000	.0003
11.96	.0021	.0009	.0005
15.99	.0009	0.0000	.0004
19.98	.0006	.0002	.0004
21.99	-.0001	.0005	.0003

M = 2.86, δ_n = -10°			
α,deg	C_Y	C_n	C_l
-2.06	-.0473	.0599	.0054
-1.04	-.0461	.0586	.0059
-.06	-.0474	.0582	.0062
.94	-.0458	.0574	.0067
1.96	-.0451	.0566	.0072
3.96	-.0455	.0565	.0084
5.96	-.0474	.0566	.0093
7.94	-.0470	.0562	.0106
9.97	-.0477	.0574	.0124
11.95	-.0485	.0586	.0137
15.96	-.0500	.0589	.0175
19.95	-.0491	.0575	.0218
21.96	-.0484	.0573	.0241

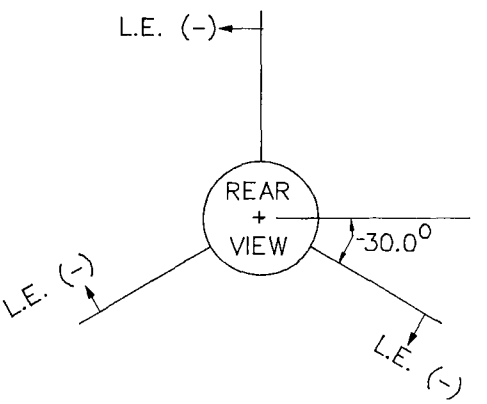


TABLE 23.- Continued

(c) Three surfaces deflected (differentially)

M = 1.70, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.30	.0010	-.0001	-.0001
-1.29	.0011	-.0002	-.0002
-.26	.0008	-.0002	-.0001
.73	.0005	-.0002	0.0000
1.74	.0012	-.0006	0.0000
3.74	.0006	-.0005	0.0000
5.74	.0004	-.0002	.0001
7.74	.0004	-.0001	.0002
9.74	0.0000	.0002	.0003
11.75	-.0002	.0007	.0005
15.73	-.0007	.0016	.0005
19.73	-.0021	.0028	.0004
21.76	-.0032	.0024	.0007
M = 2.16, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.14	.0012	-.0005	0.0000
-1.15	.0009	-.0005	0.0000
-.14	.0010	-.0006	0.0000
.86	.0009	-.0005	0.0000
1.85	.0013	-.0006	0.0000
3.86	.0010	-.0005	.0001
5.85	.0005	-.0002	.0001
7.87	.0003	0.0000	.0003
9.87	.0001	.0003	.0003
11.87	-.0002	.0004	.0002
15.86	.0005	.0011	.0003
19.86	-.0004	.0015	.0002
21.87	0.0000	.0014	.0002

M = 1.70, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.34	-.0686	.0857	0.0000
-1.29	-.0682	.0849	.0001
-.25	-.0670	.0833	.0003
.66	-.0669	.0827	.0004
1.71	-.0661	.0815	.0005
3.73	-.0660	.0805	.0008
5.76	-.0653	.0796	.0009
7.77	-.0638	.0777	.0010
9.73	-.0626	.0759	.0012
11.74	-.0618	.0743	.0014
15.72	-.0594	.0711	.0019
19.77	-.0558	.0647	.0028
21.75	-.0534	.0596	.0038
M = 2.16, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.19	-.0503	.0628	-.0010
-1.16	-.0496	.0617	-.0008
-.12	-.0490	.0607	-.0005
.87	-.0480	.0595	-.0004
1.88	-.0477	.0587	-.0002
3.88	-.0471	.0577	.0003
5.86	-.0466	.0569	.0008
7.89	-.0462	.0557	.0014
9.83	-.0455	.0549	.0020
11.85	-.0451	.0540	.0028
15.86	-.0441	.0533	.0039
19.92	-.0406	.0476	.0064
21.84	-.0362	.0431	.0076

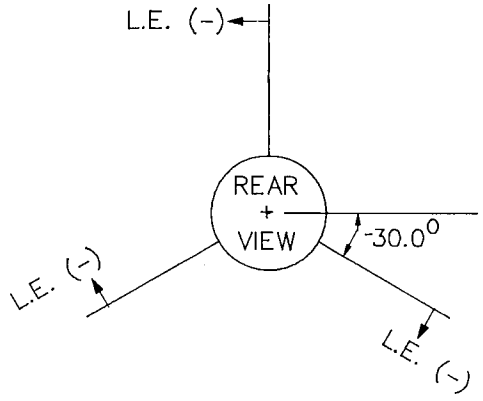


TABLE 23.- Concluded

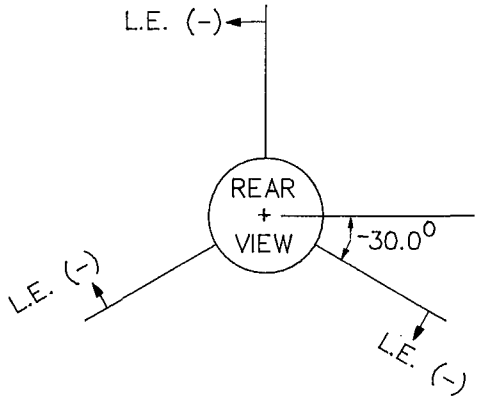
(c) Concluded

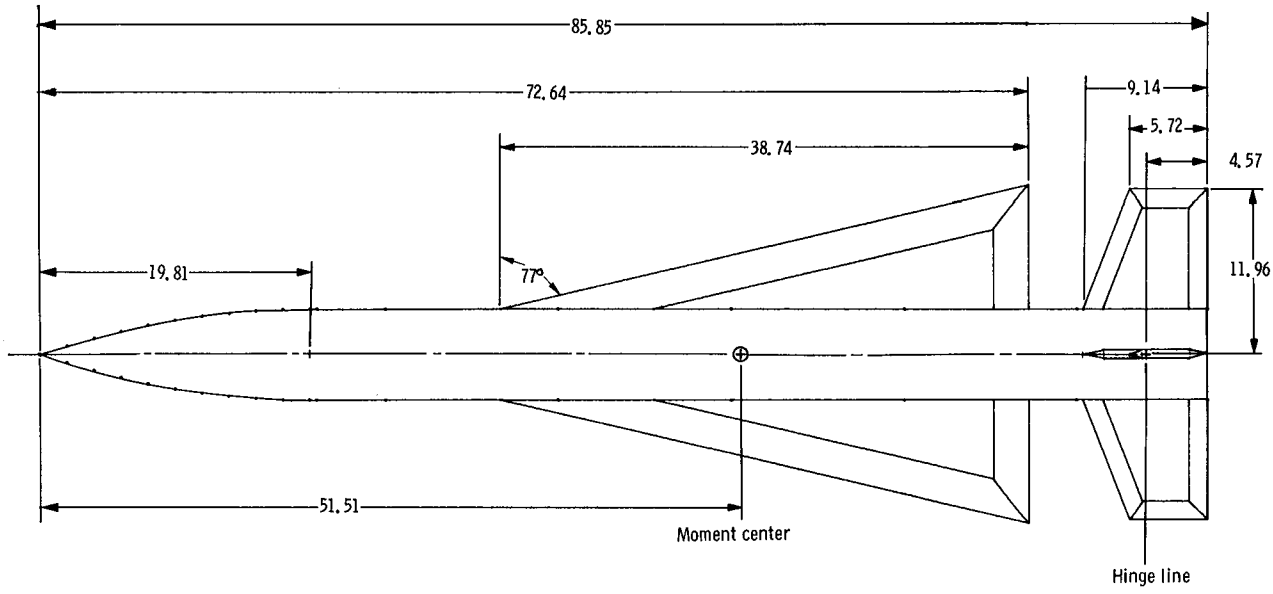
M = 2.36, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-1.78	.0036	-.0016	-.0001
-.81	.0023	-.0012	0.0000
.22	.0028	-.0011	.0001
1.23	.0018	-.0011	.0001
2.24	.0017	-.0008	.0003
4.24	.0023	-.0010	.0003
6.23	.0015	-.0009	.0003
8.23	.0022	-.0004	.0006
10.23	.0018	.0001	.0006
12.28	.0020	.0004	.0005
16.22	.0018	.0008	.0004
20.20	.0005	0.0000	.0004
22.24	-.0005	.0006	.0005

M = 2.86, $\delta_{n,V} = 0^0$, $\delta_{n,H} = 0^0$			
α,deg	C_Y	C_n	C_l
-2.04	.0013	-.0007	.0002
-1.04	.0008	-.0005	.0002
-.04	.0017	-.0007	.0002
.97	.0012	-.0005	.0003
1.97	.0014	-.0005	.0003
3.99	.0015	-.0005	.0004
5.97	.0011	-.0004	.0003
7.98	.0010	-.0003	.0002
9.98	.0003	0.0000	.0003
11.96	.0021	.0009	.0005
15.99	.0009	0.0000	.0004
19.98	.0006	.0002	.0004
21.99	-.0001	.0005	.0003

M = 2.36, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-1.79	-.0428	.0559	-.0012
-.78	-.0435	.0552	-.0010
.24	-.0431	.0543	-.0007
1.24	-.0419	.0531	-.0001
2.25	-.0421	.0527	.0002
4.19	-.0420	.0519	.0005
6.23	-.0403	.0506	.0012
8.20	-.0411	.0502	.0019
10.22	-.0416	.0496	.0025
12.27	-.0392	.0498	.0038
16.22	-.0401	.0485	.0050
20.24	-.0334	.0429	.0081
22.29	-.0324	.0397	.0093

M = 2.86, $\delta_{n,V} = -10^0$, $\delta_{n,H} = -5^0$			
α,deg	C_Y	C_n	C_l
-2.05	-.0360	.0450	-.0013
-1.05	-.0352	.0440	-.0009
-.05	-.0345	.0434	-.0006
.96	-.0345	.0427	-.0002
1.94	-.0342	.0422	0.0000
3.97	-.0336	.0414	.0008
5.97	-.0334	.0411	.0017
7.94	-.0337	.0408	.0024
9.96	-.0336	.0403	.0033
11.96	-.0346	.0413	.0042
15.96	-.0324	.0402	.0069
19.97	-.0311	.0370	.0098
21.96	-.0298	.0352	.0113





Model 2 (top view)

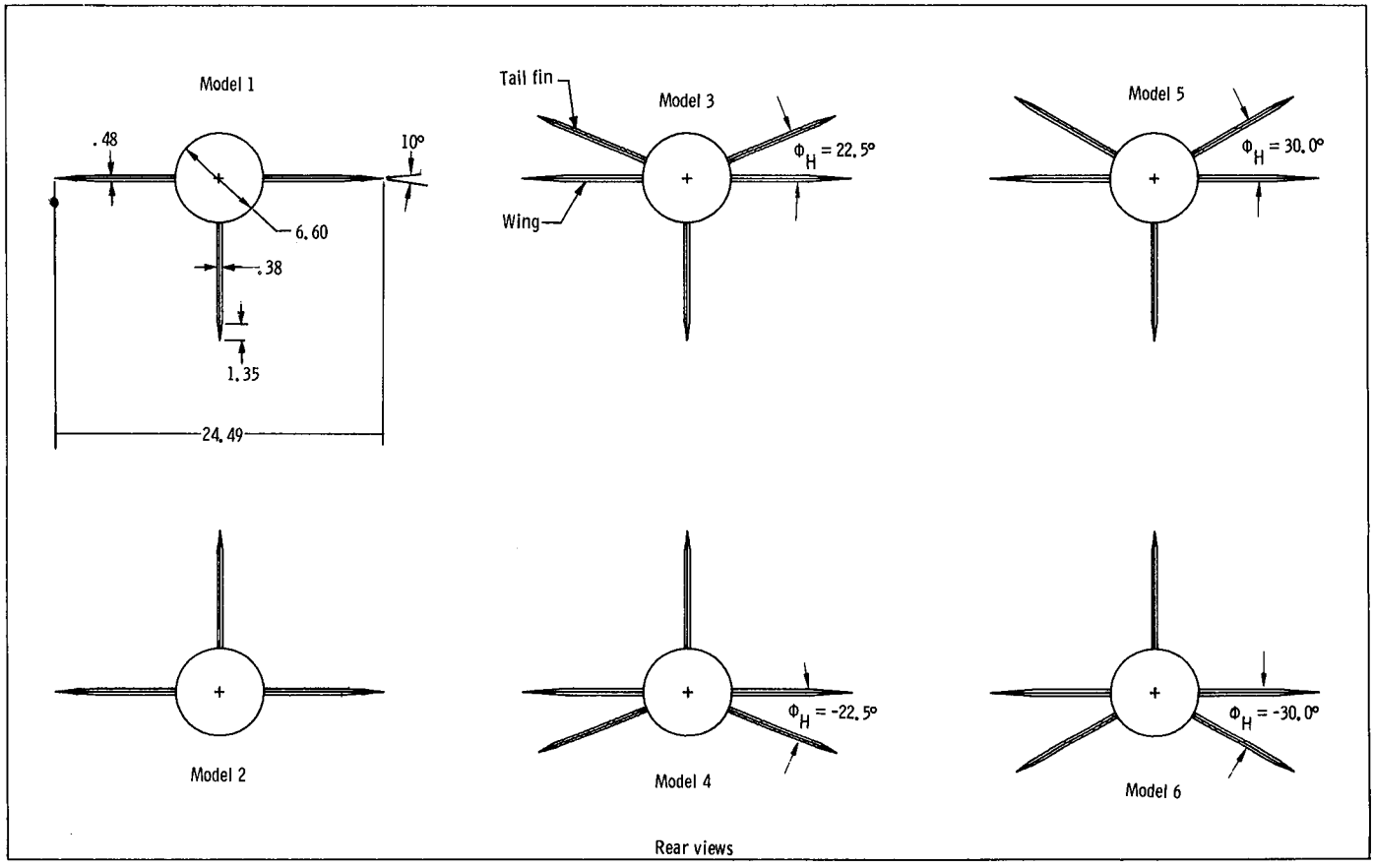
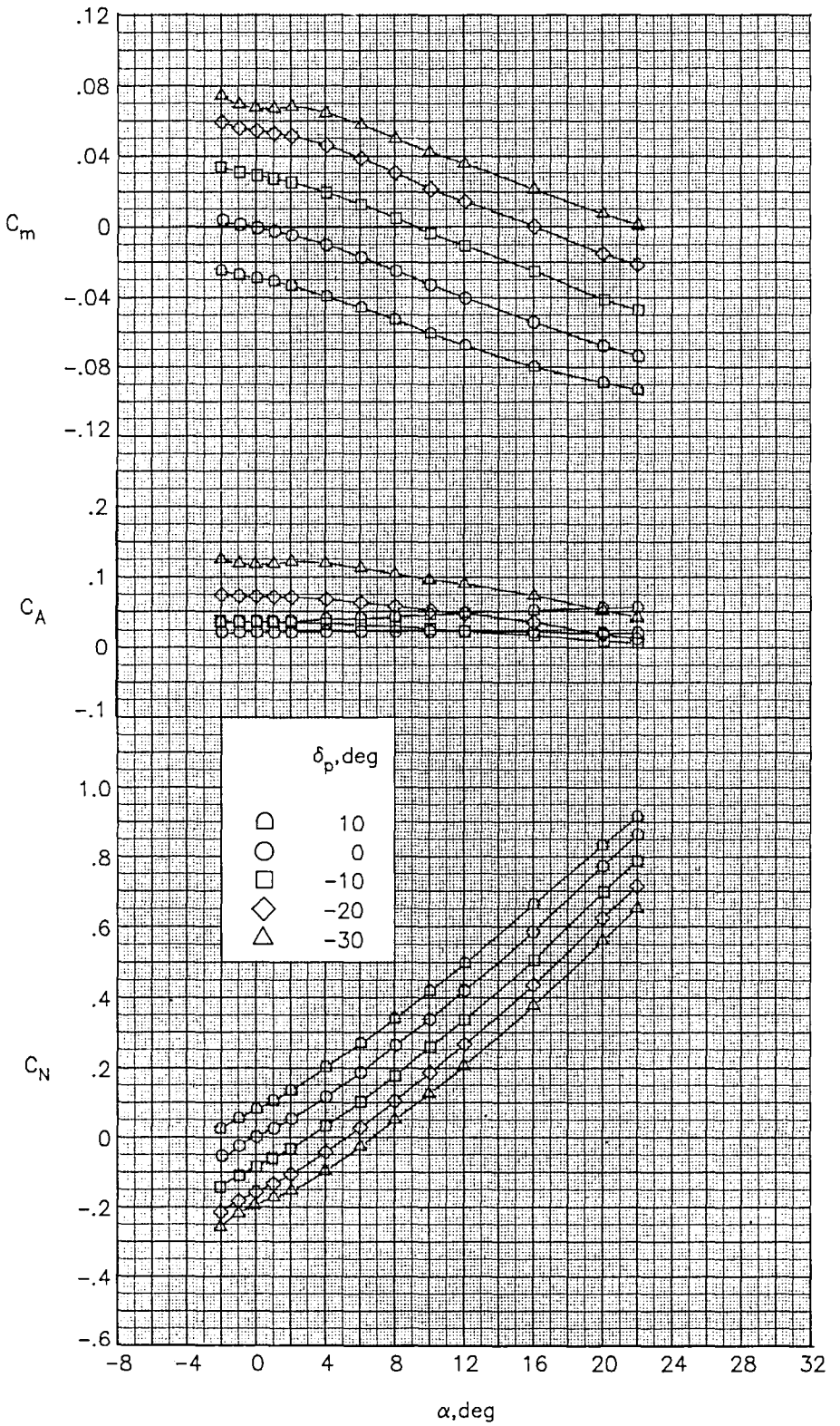
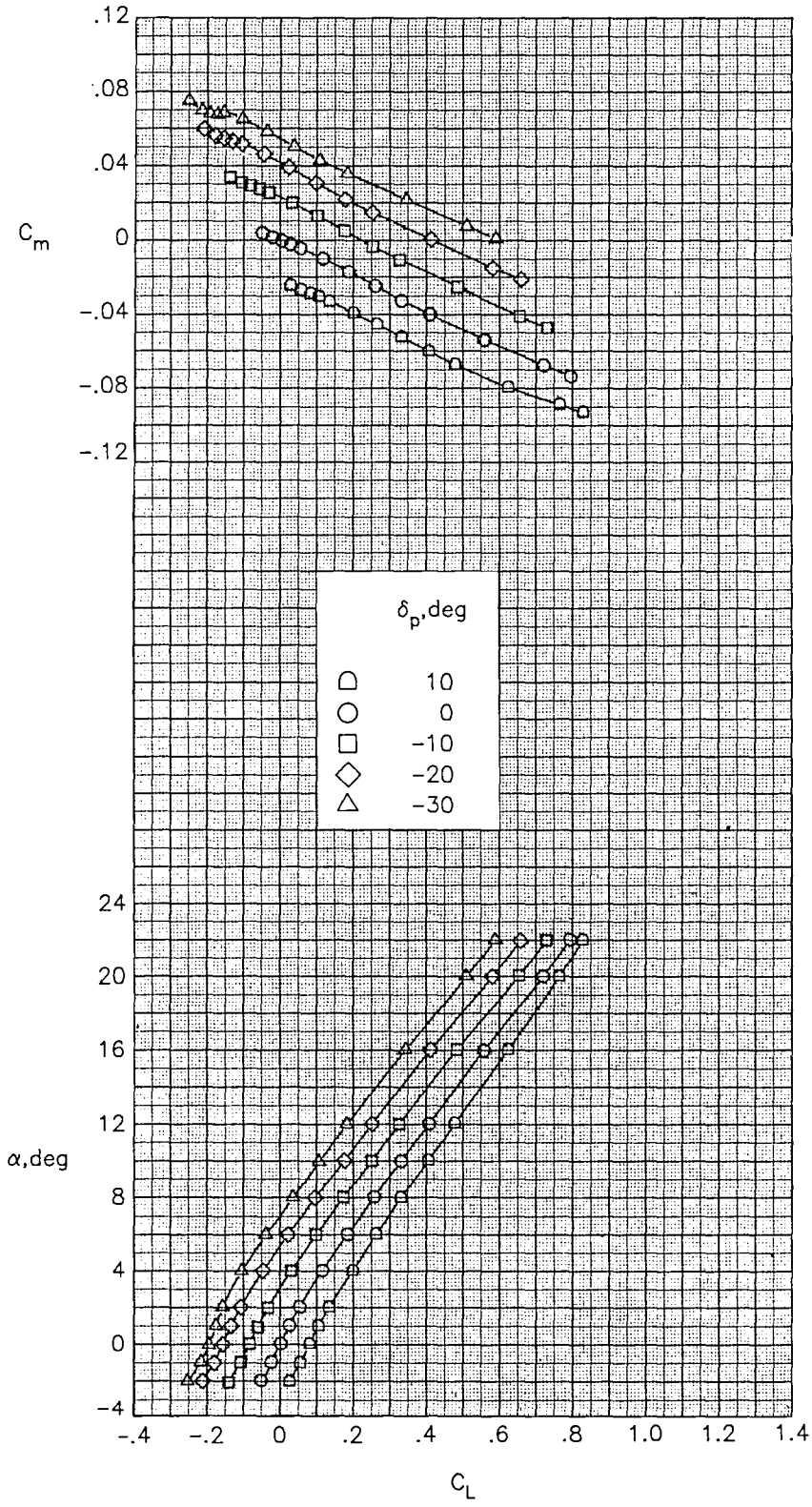


Figure 1.- Model details. All dimensions are in centimeters.



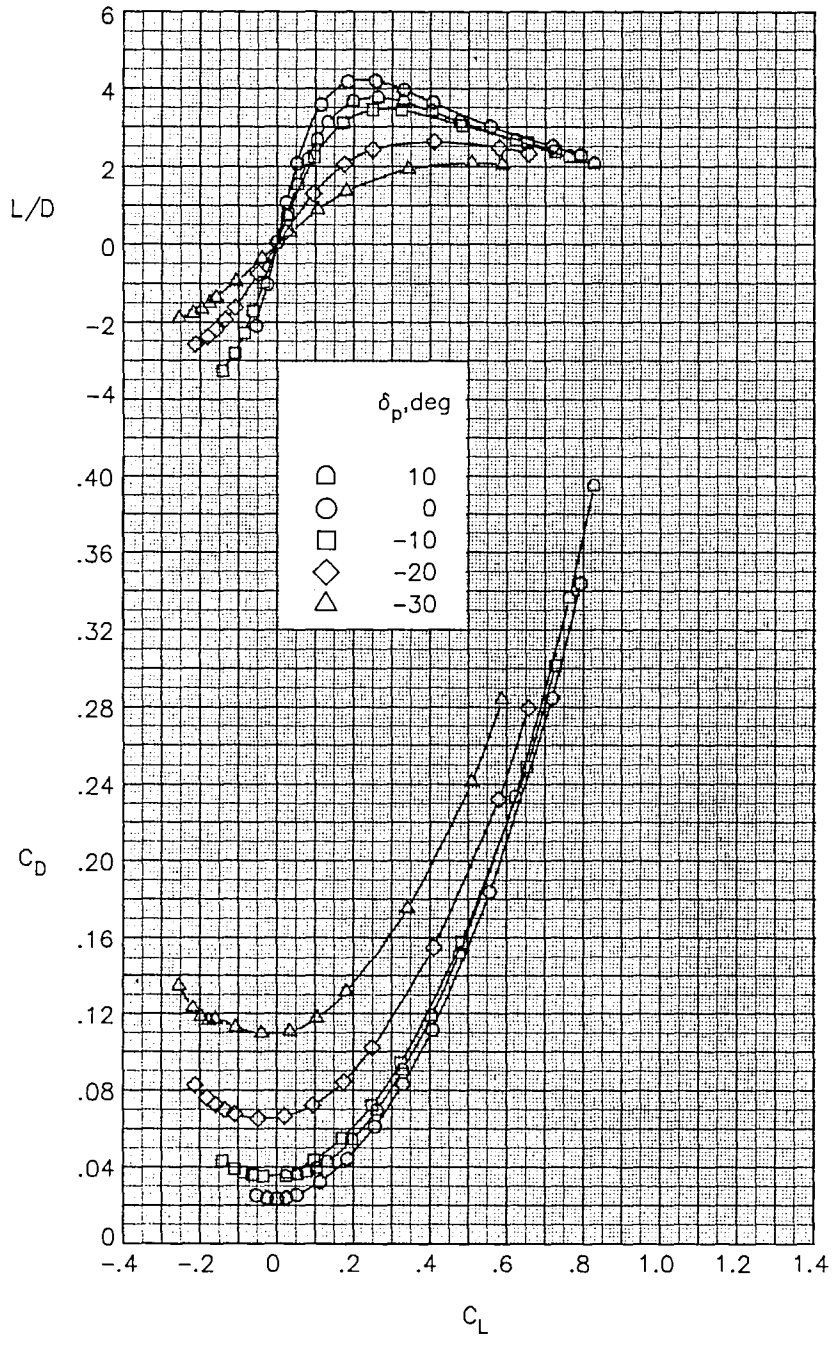
(a) Model 1.

Figure 2.- Longitudinal aerodynamic characteristics at M = 1.70.



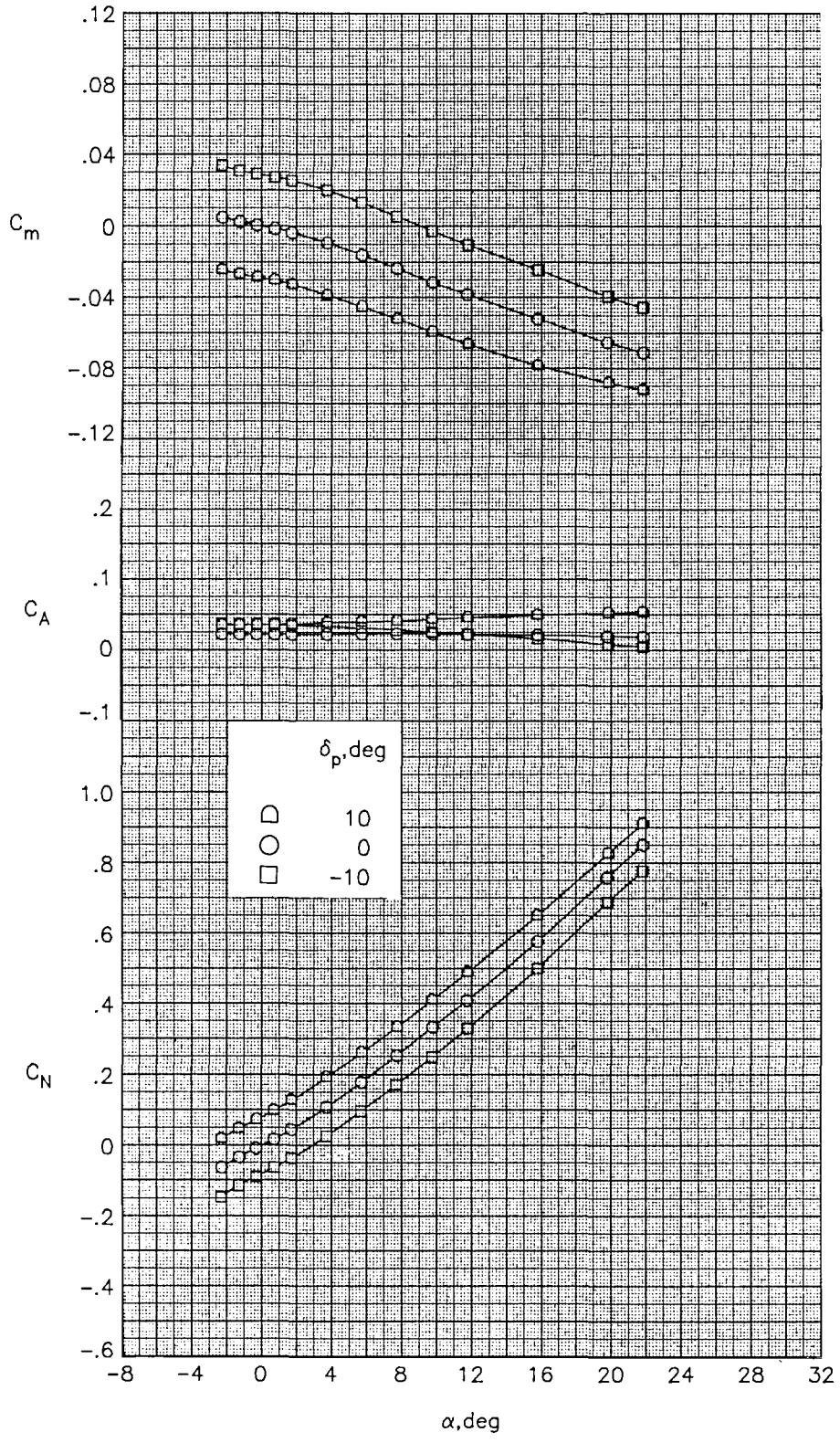
(a) Continued.

Figure 2.- Continued.



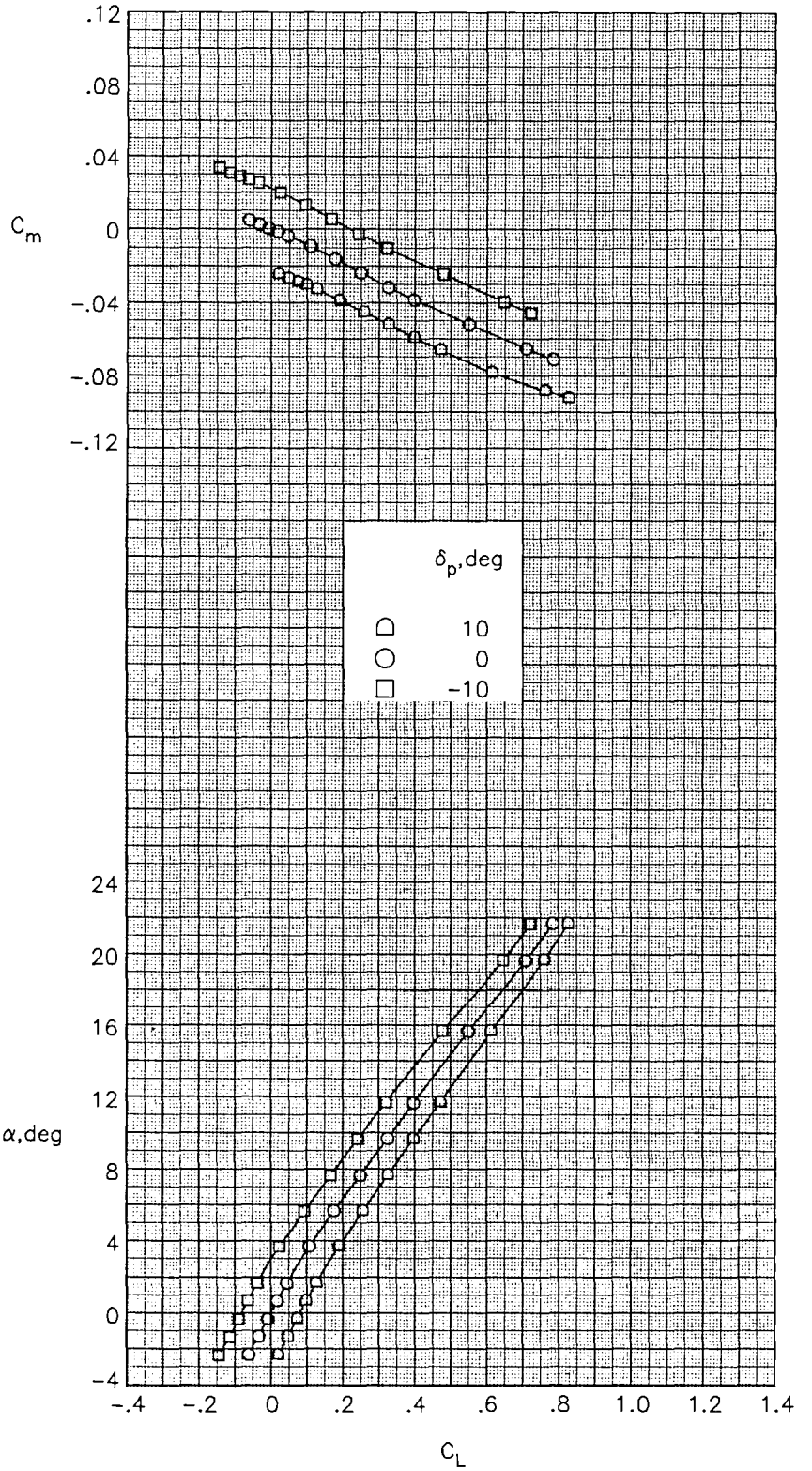
(a) Concluded.

Figure 2.- Continued.



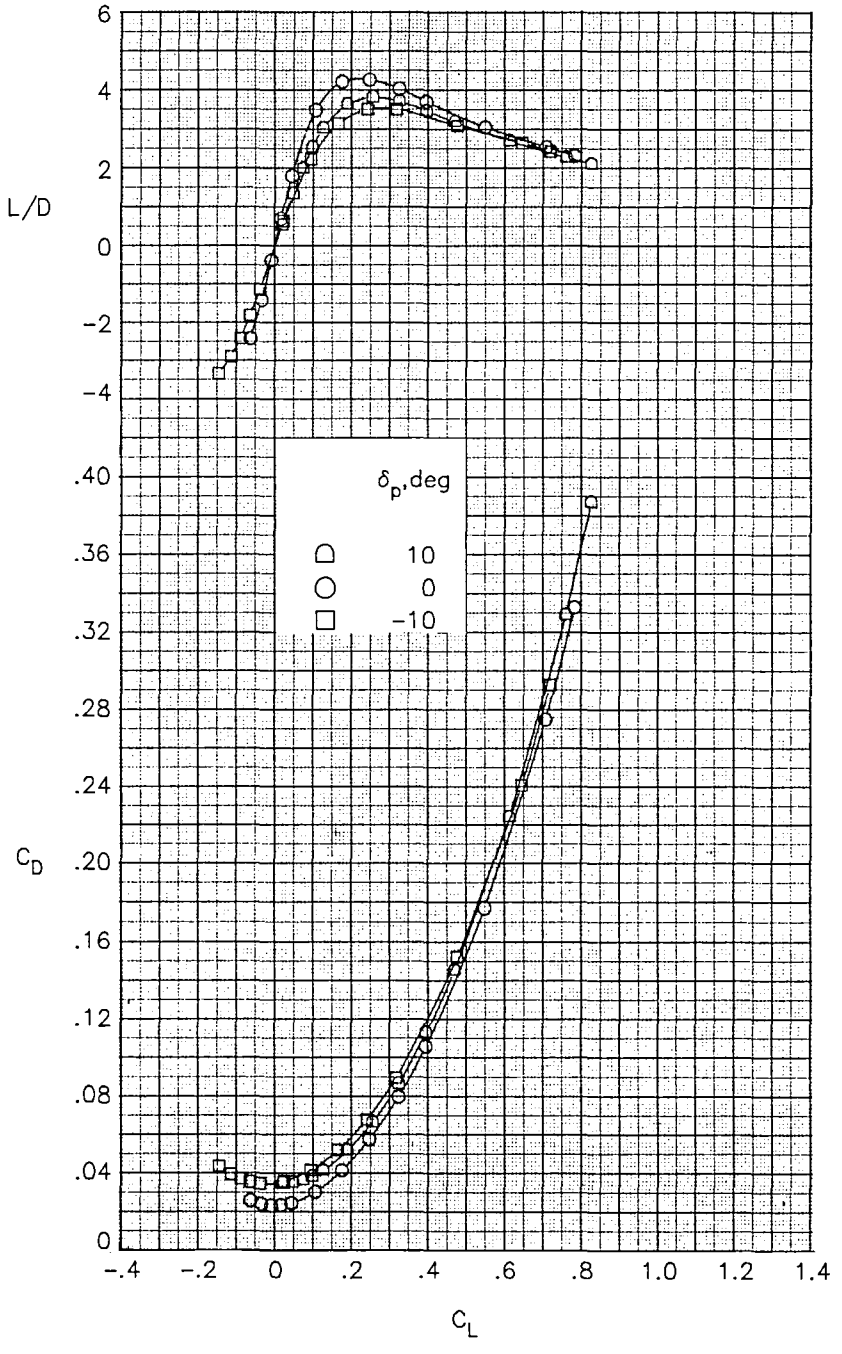
(b) Model 2.

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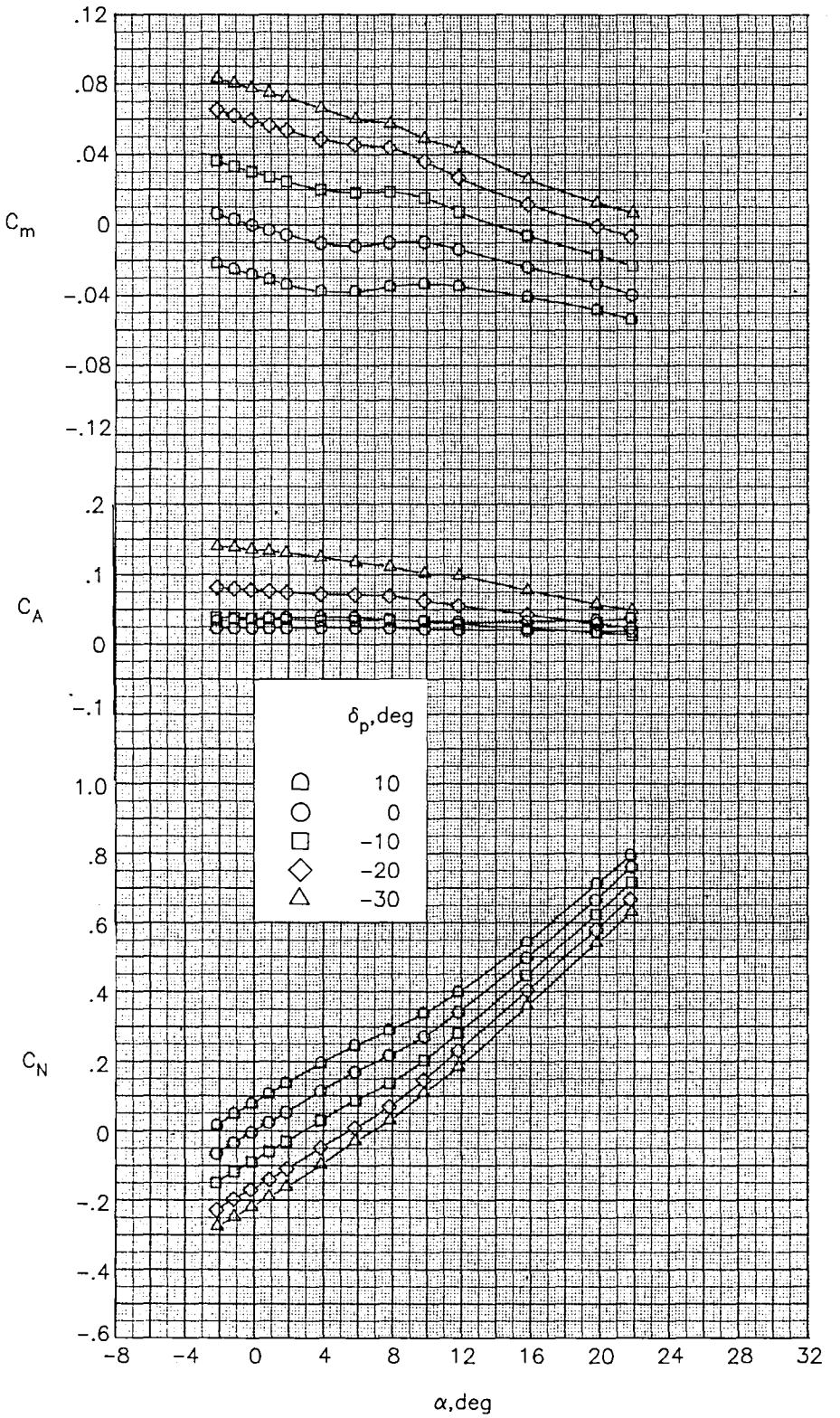
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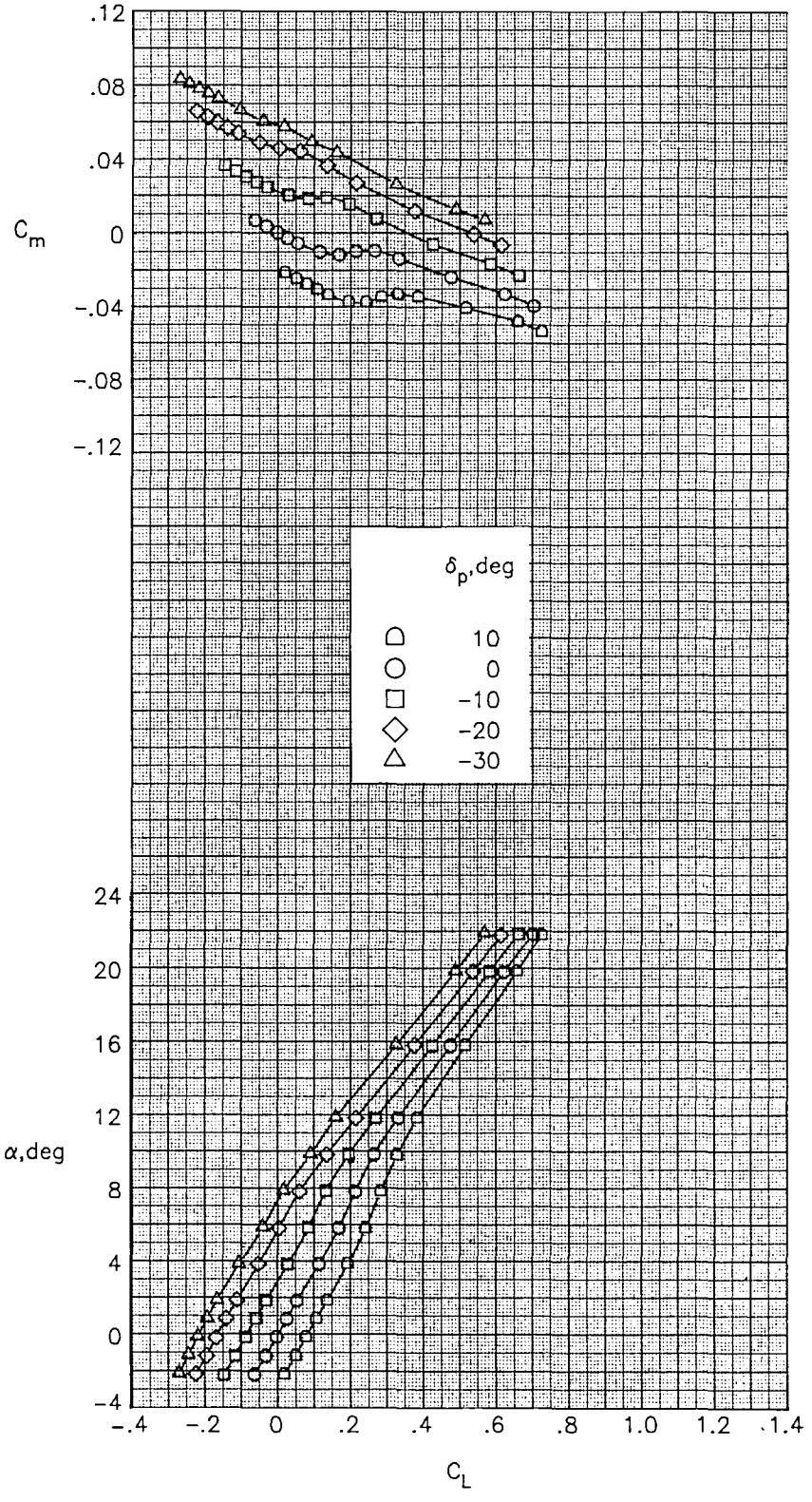
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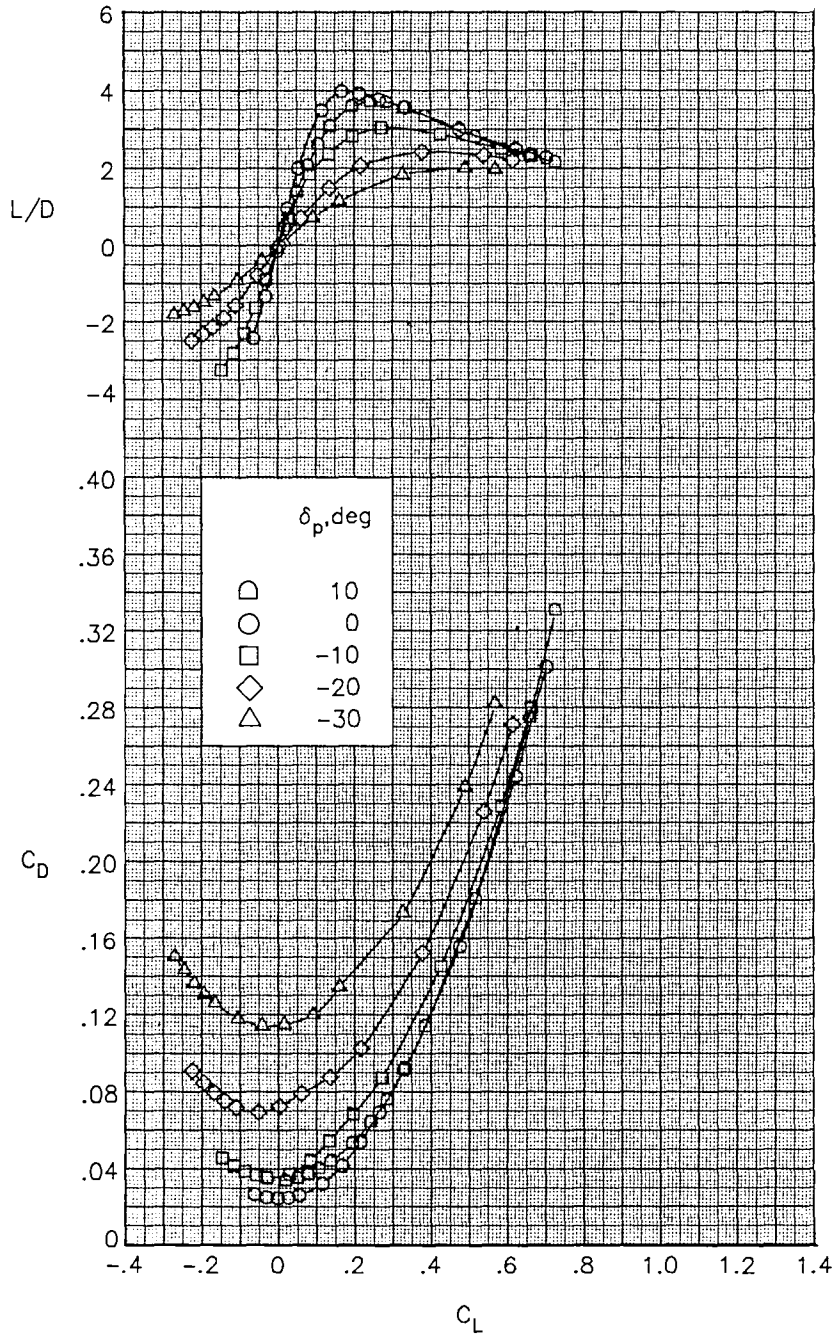
(c) Model 3.

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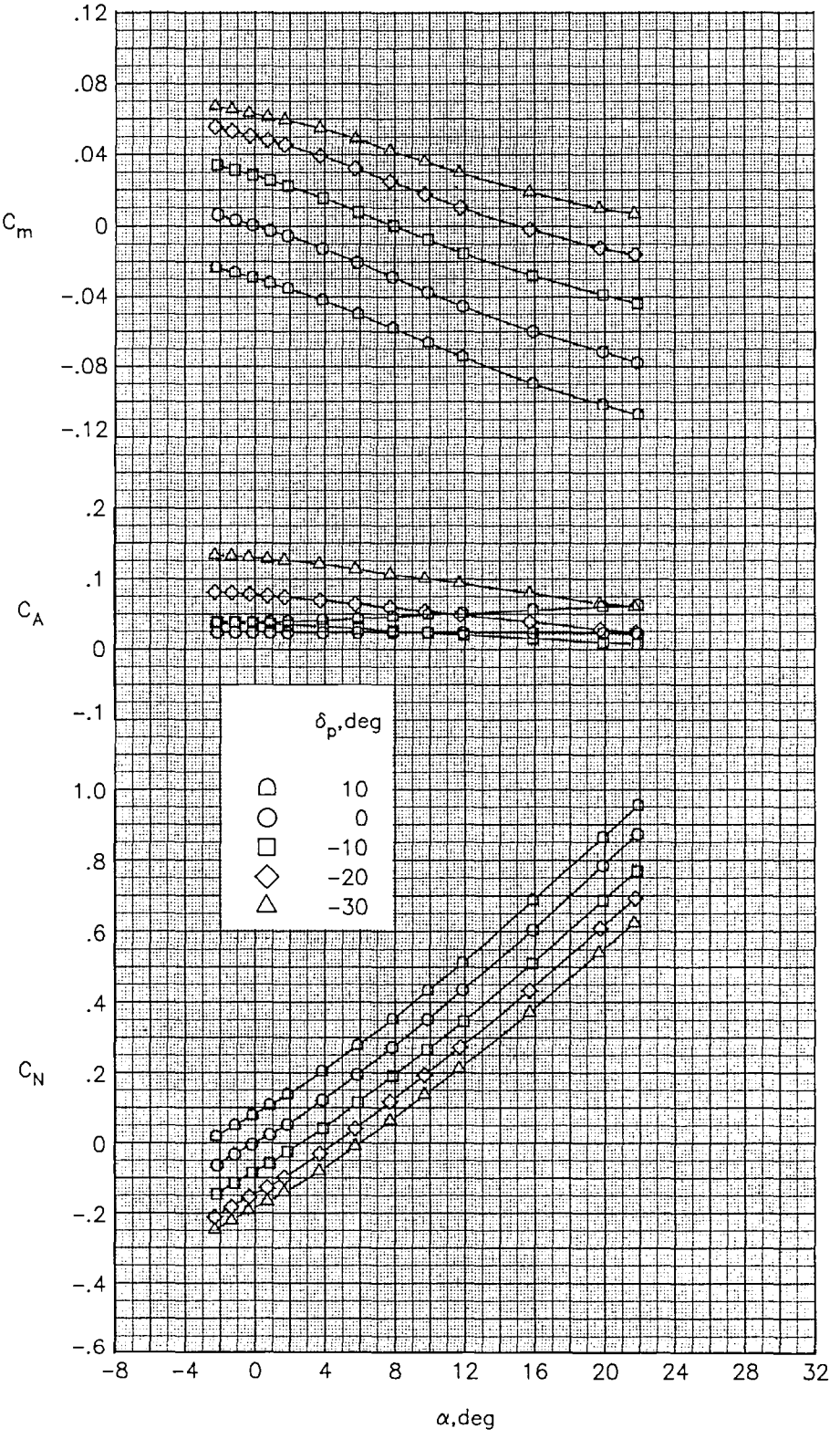
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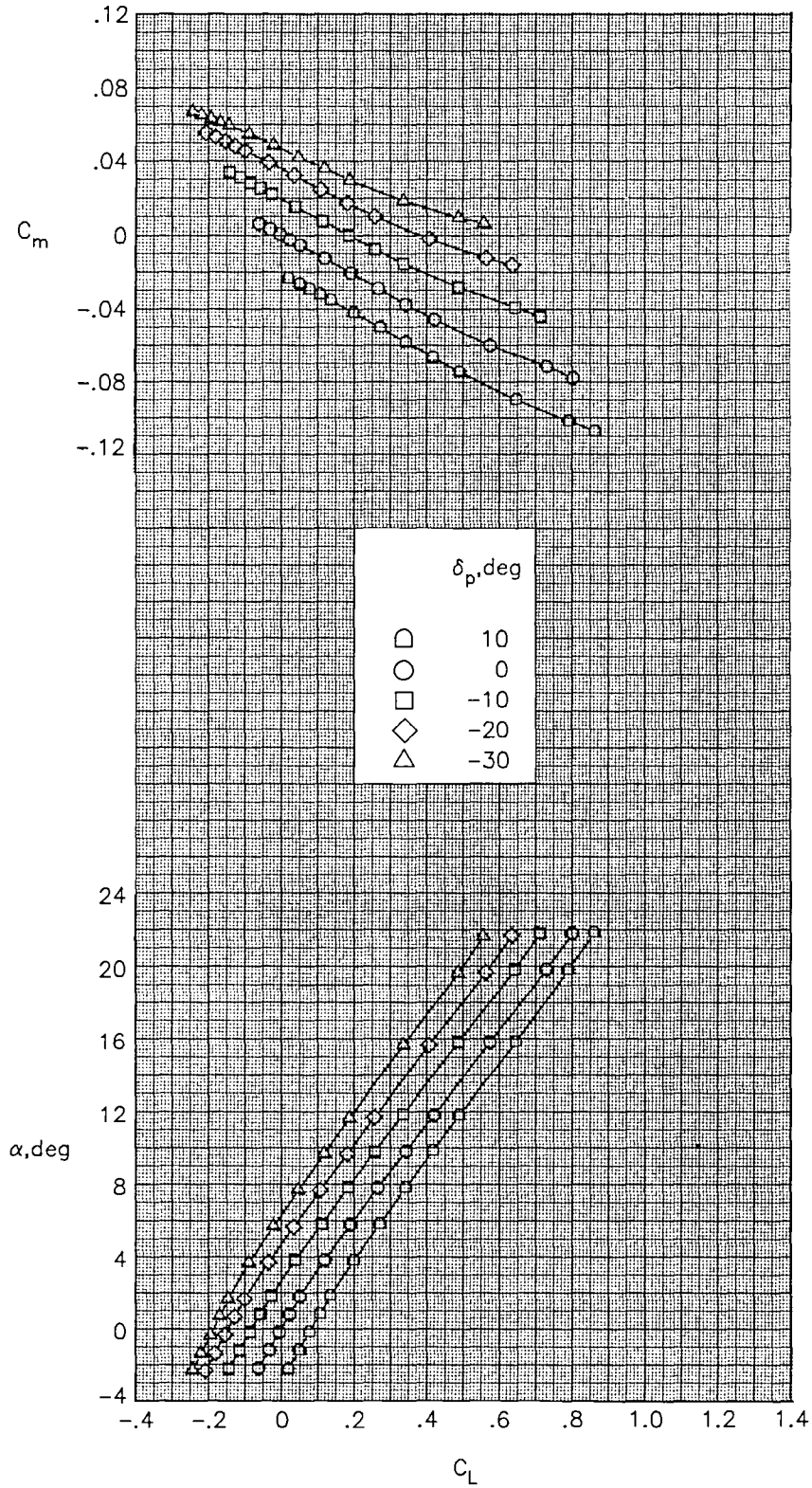
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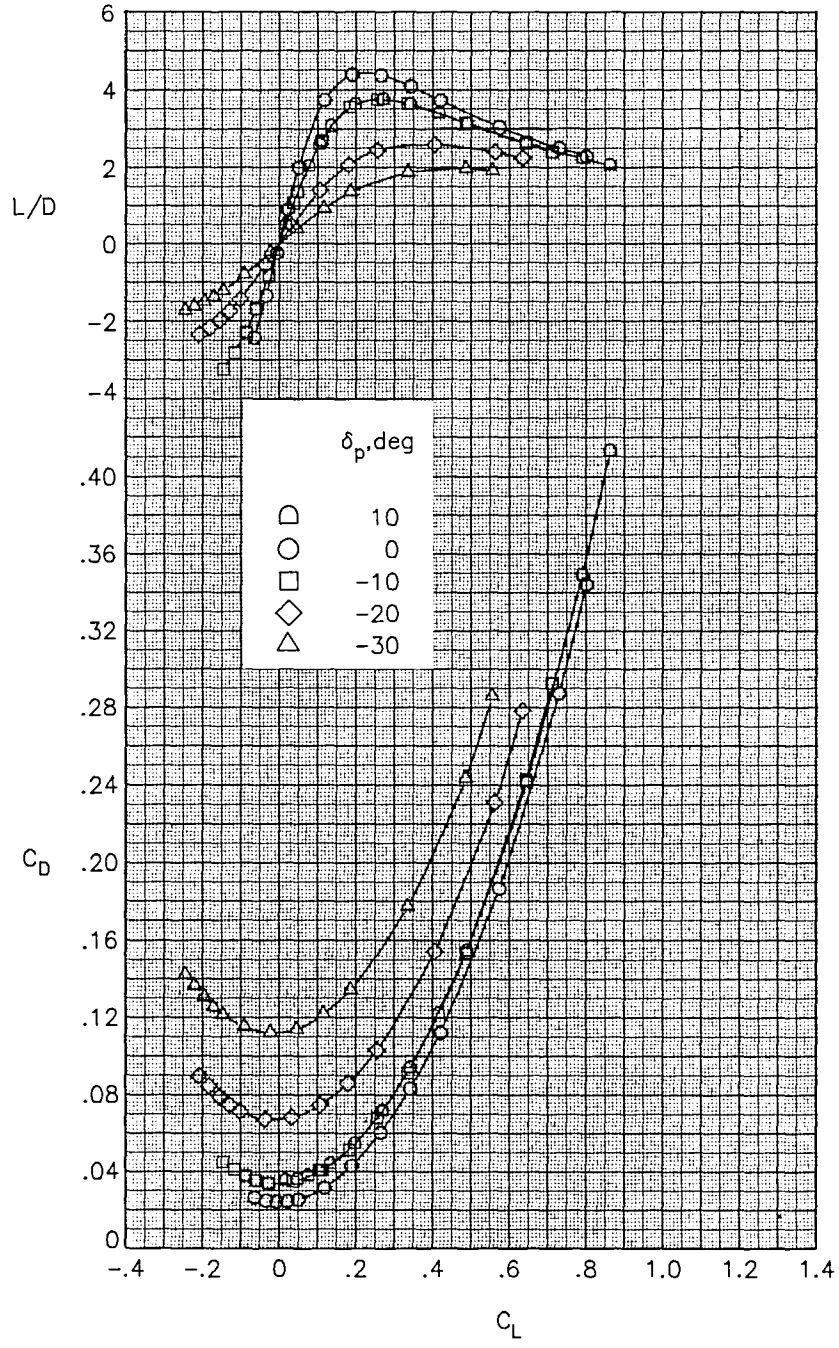
(d) Model 4.

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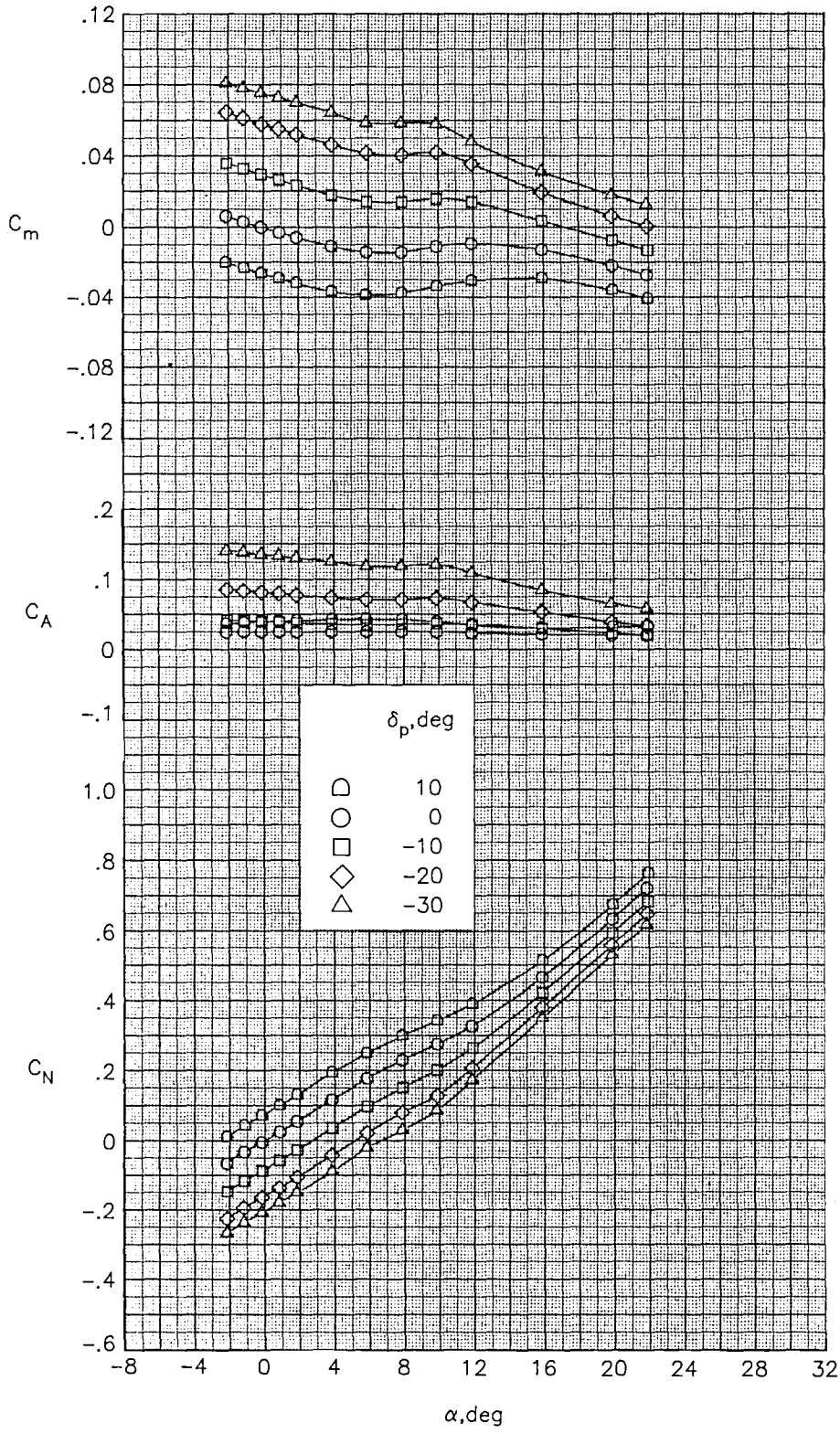
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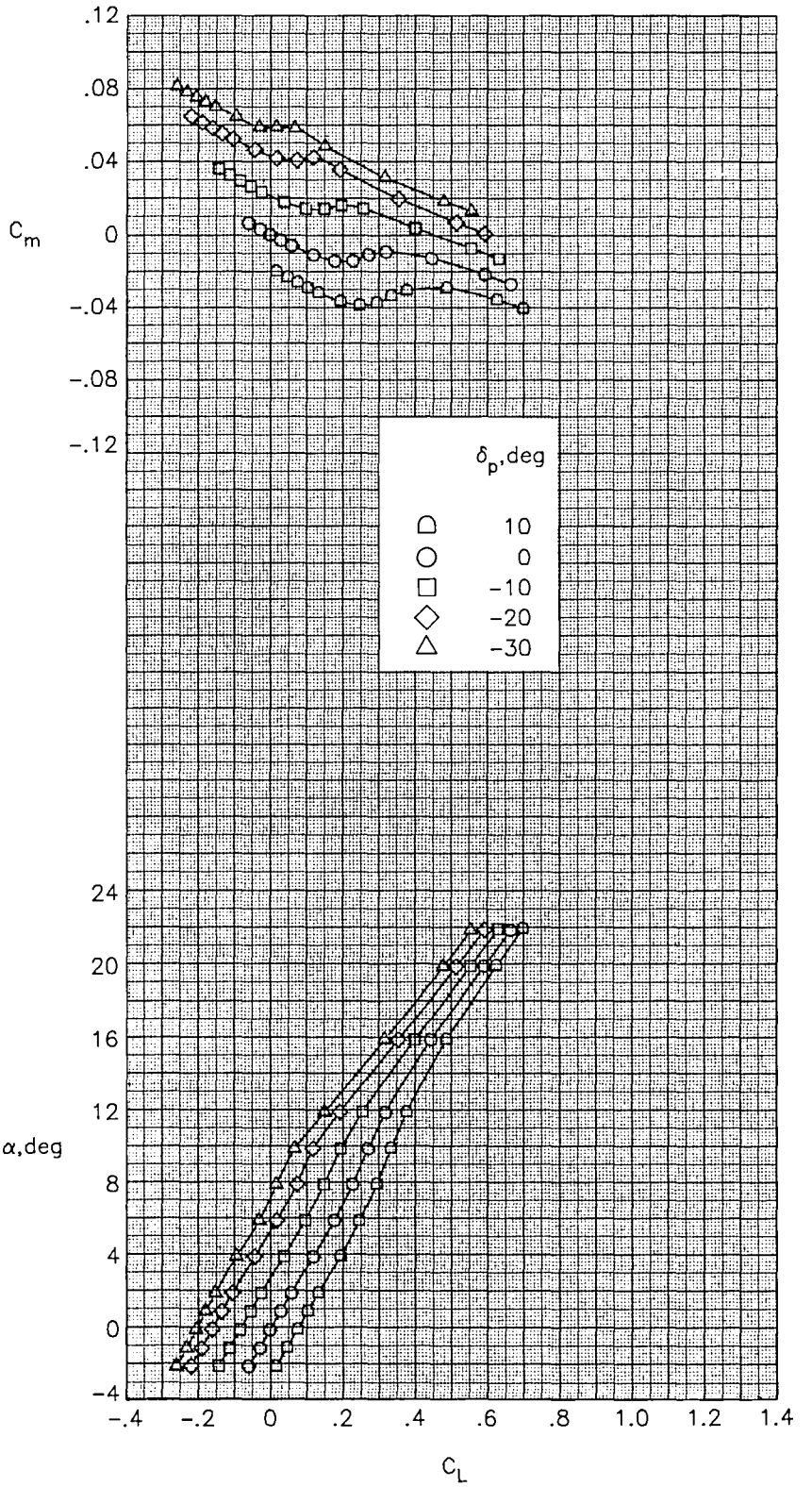
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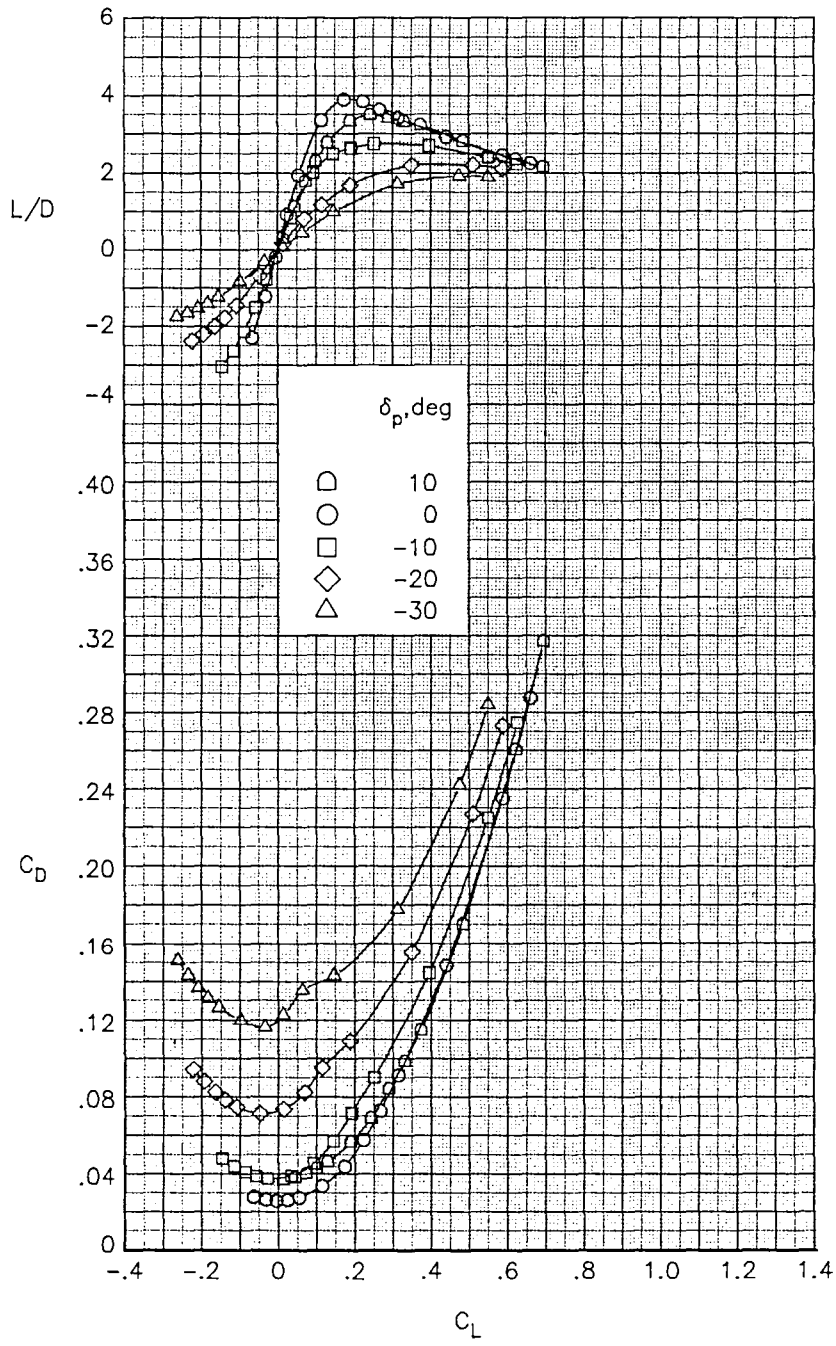
(e) Model 5.

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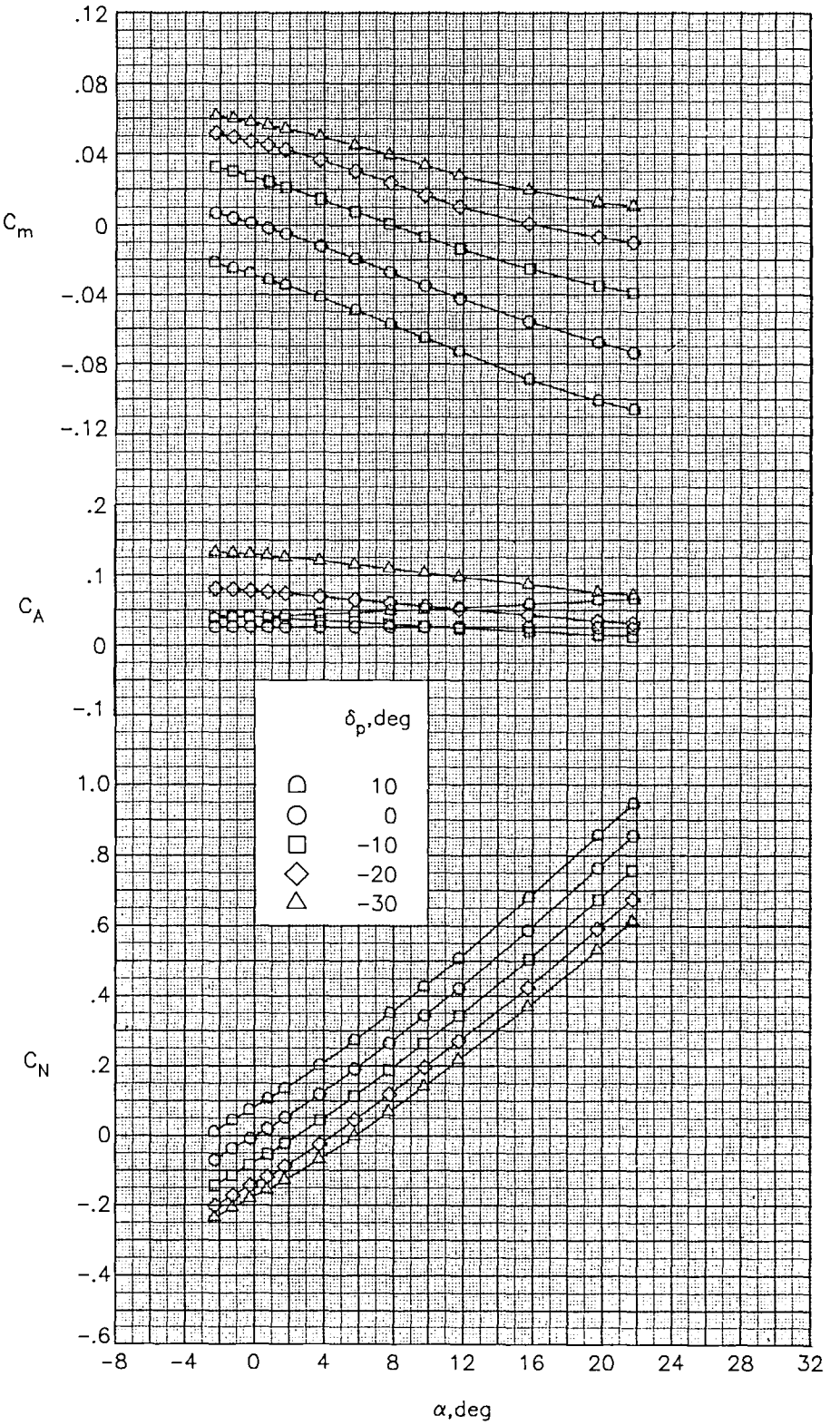
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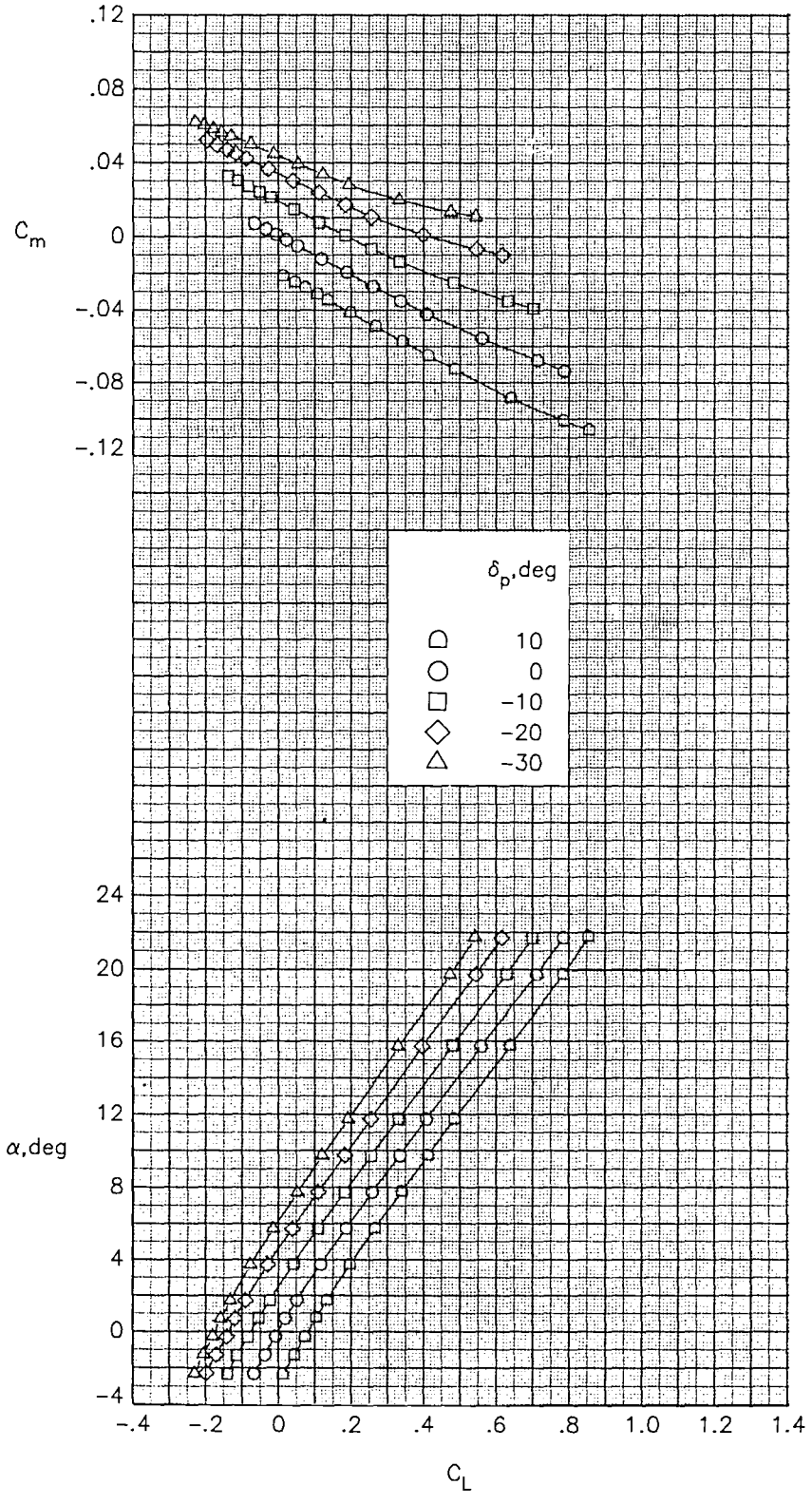
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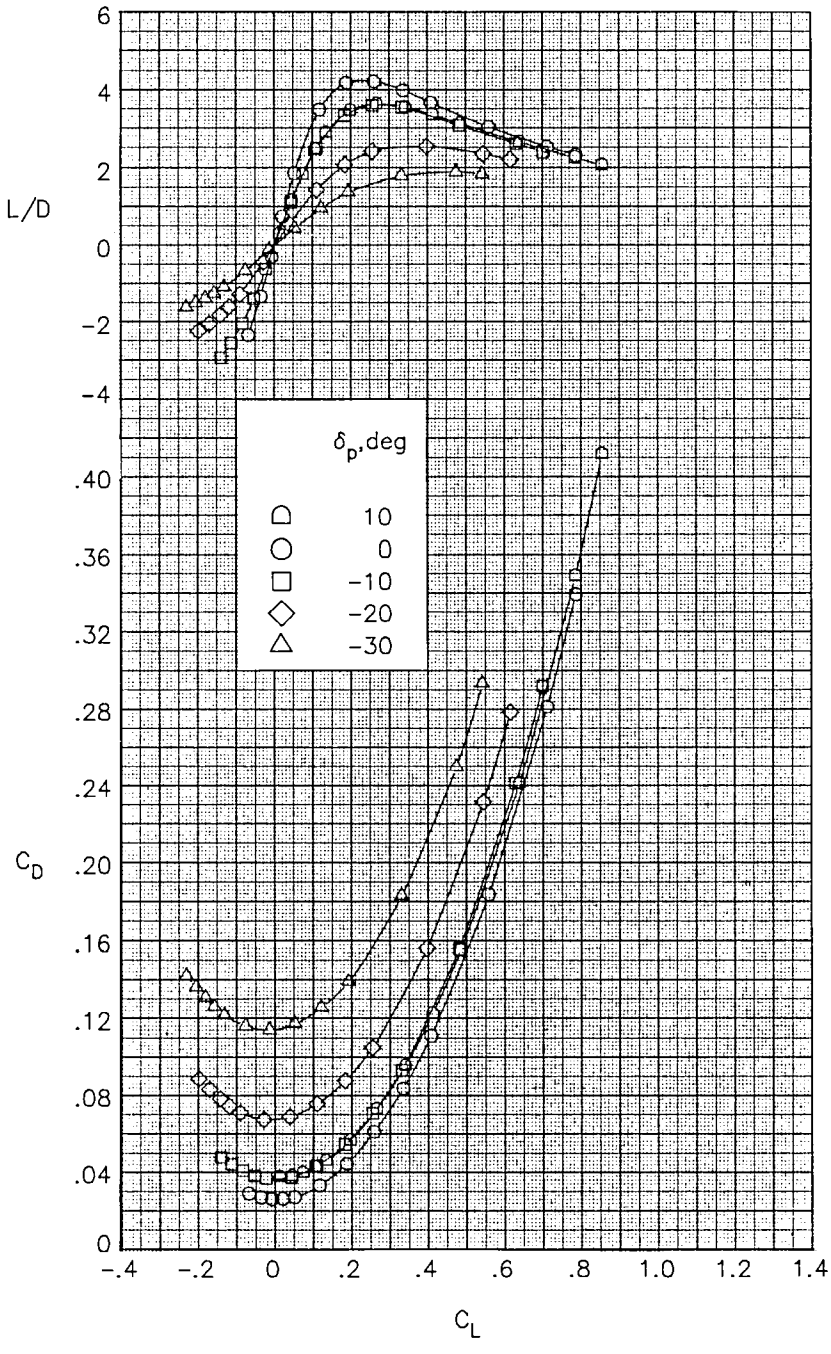
(f) Model 6.

Figure 2.- Continued.



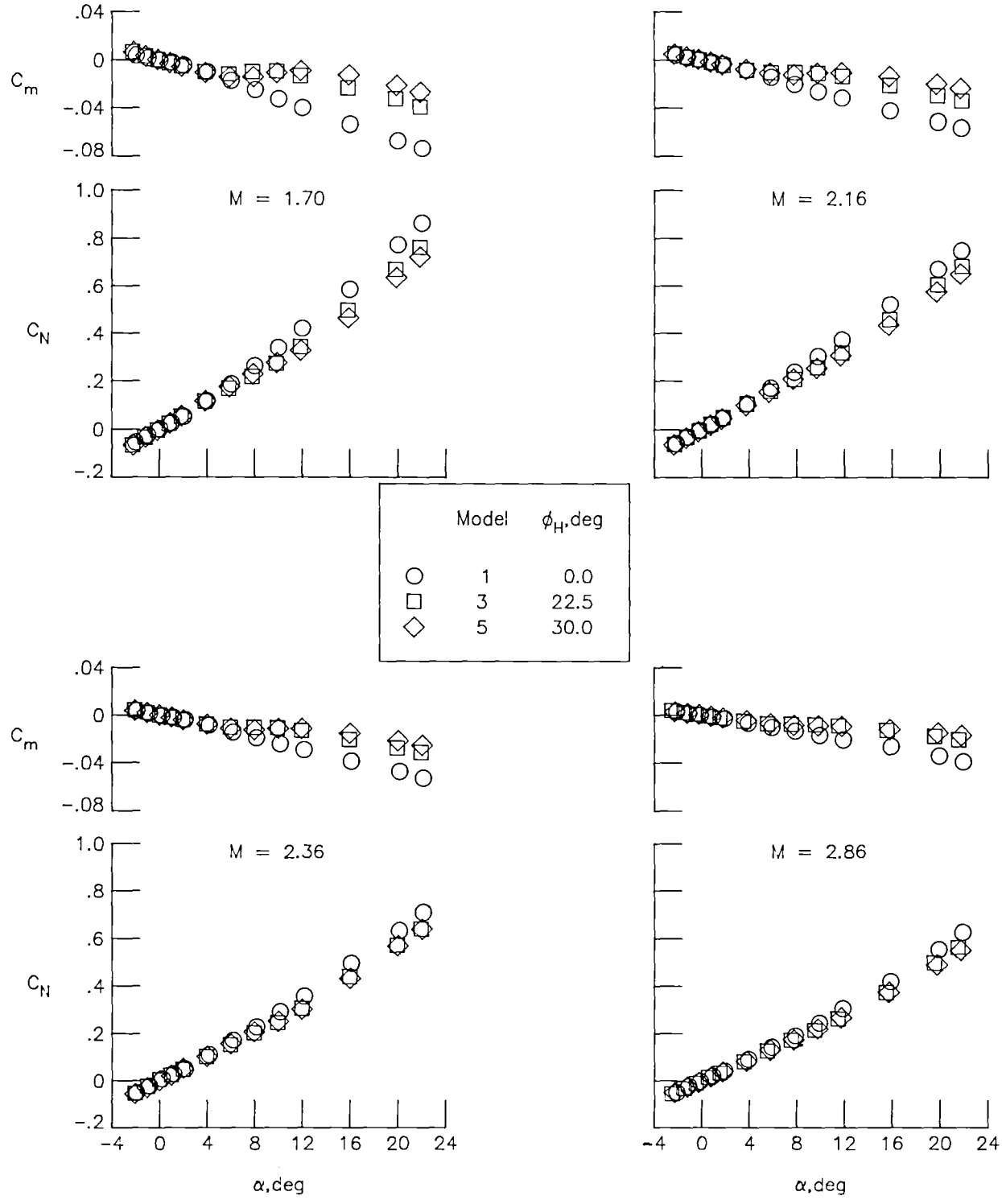
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Figure 2.- Continued.



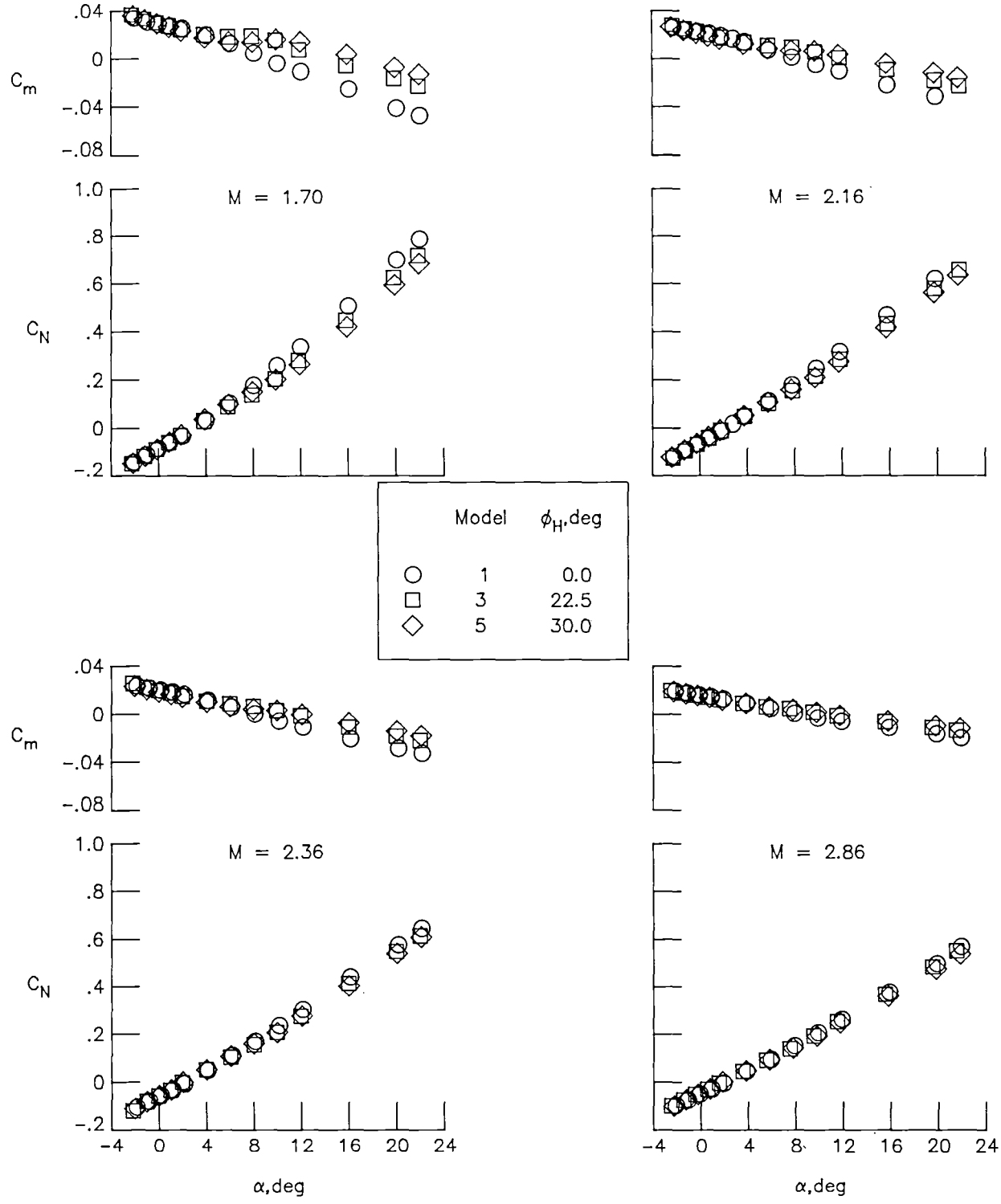
(f) Concluded.

Figure 2.- Concluded.



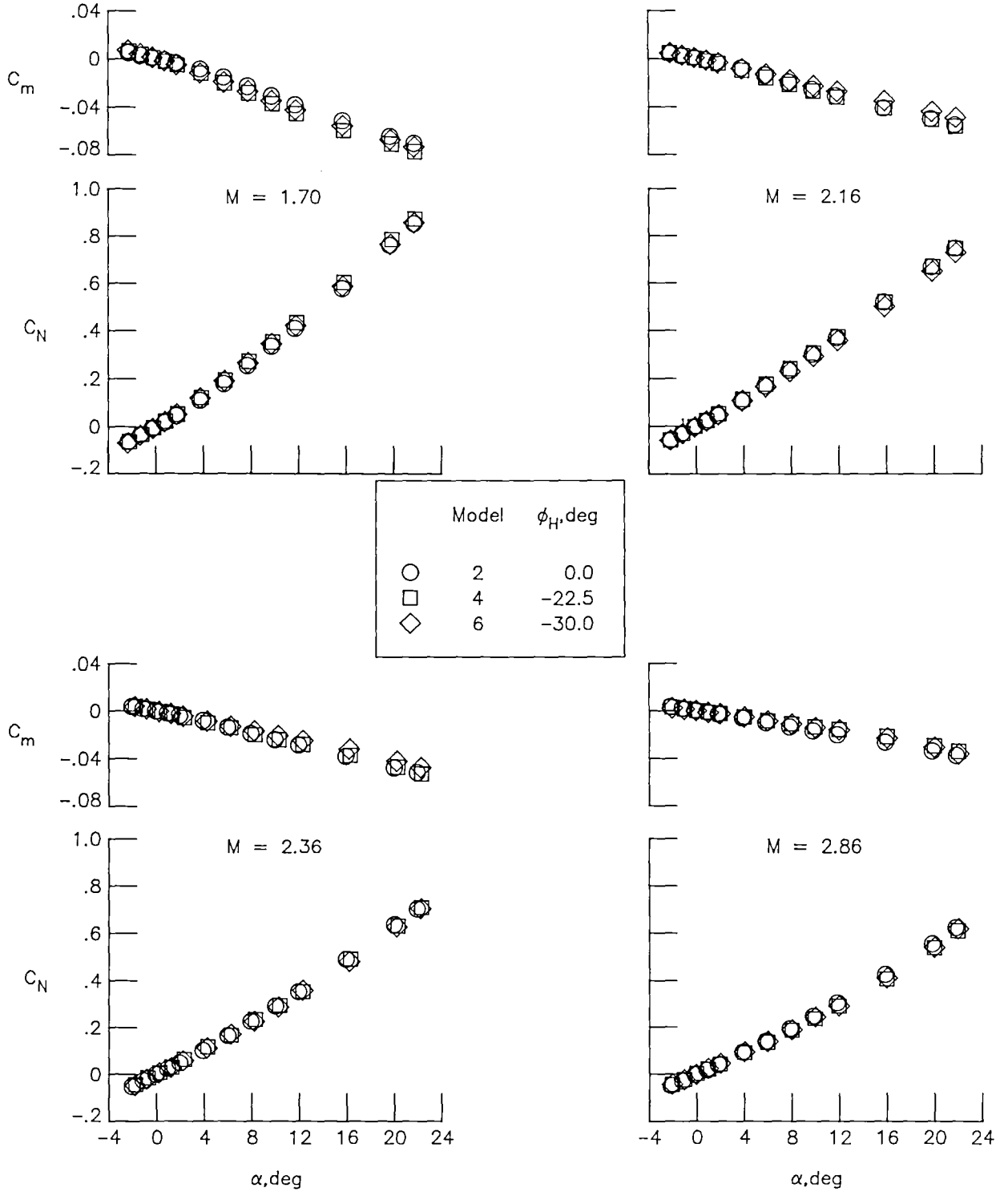
(a) $\delta_p = 0°$.

Figure 3.- Pitch-control characteristics for models 1, 3, and 5.



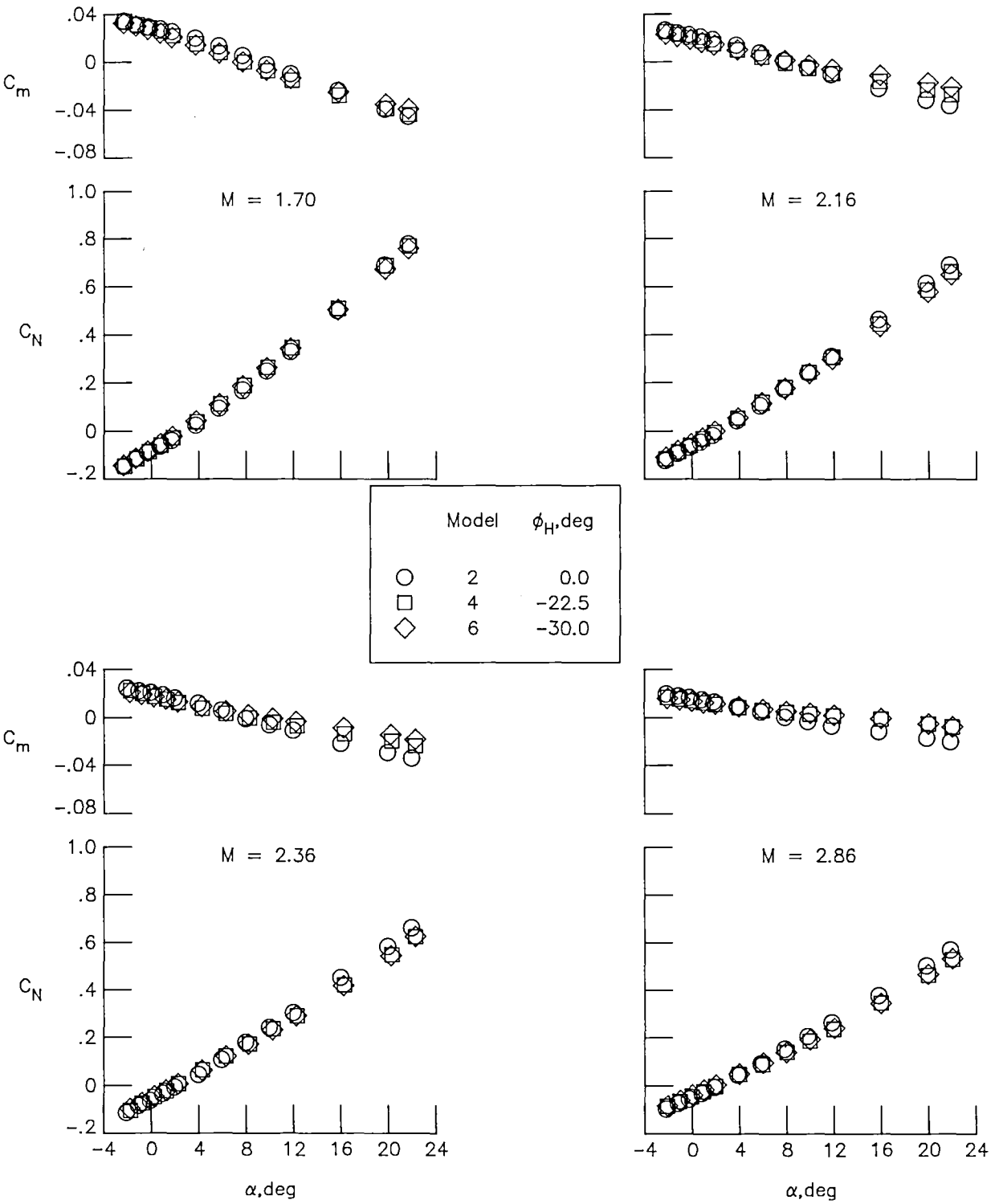
(b) $\delta_p = -10°$.

Figure 3.- Concluded.



(a) $\delta_p = 0°$.

Figure 4.- Pitch-control characteristics for models 2, 4, and 6.



(b) $\delta_p = -10°$.

Figure 4.- Concluded.

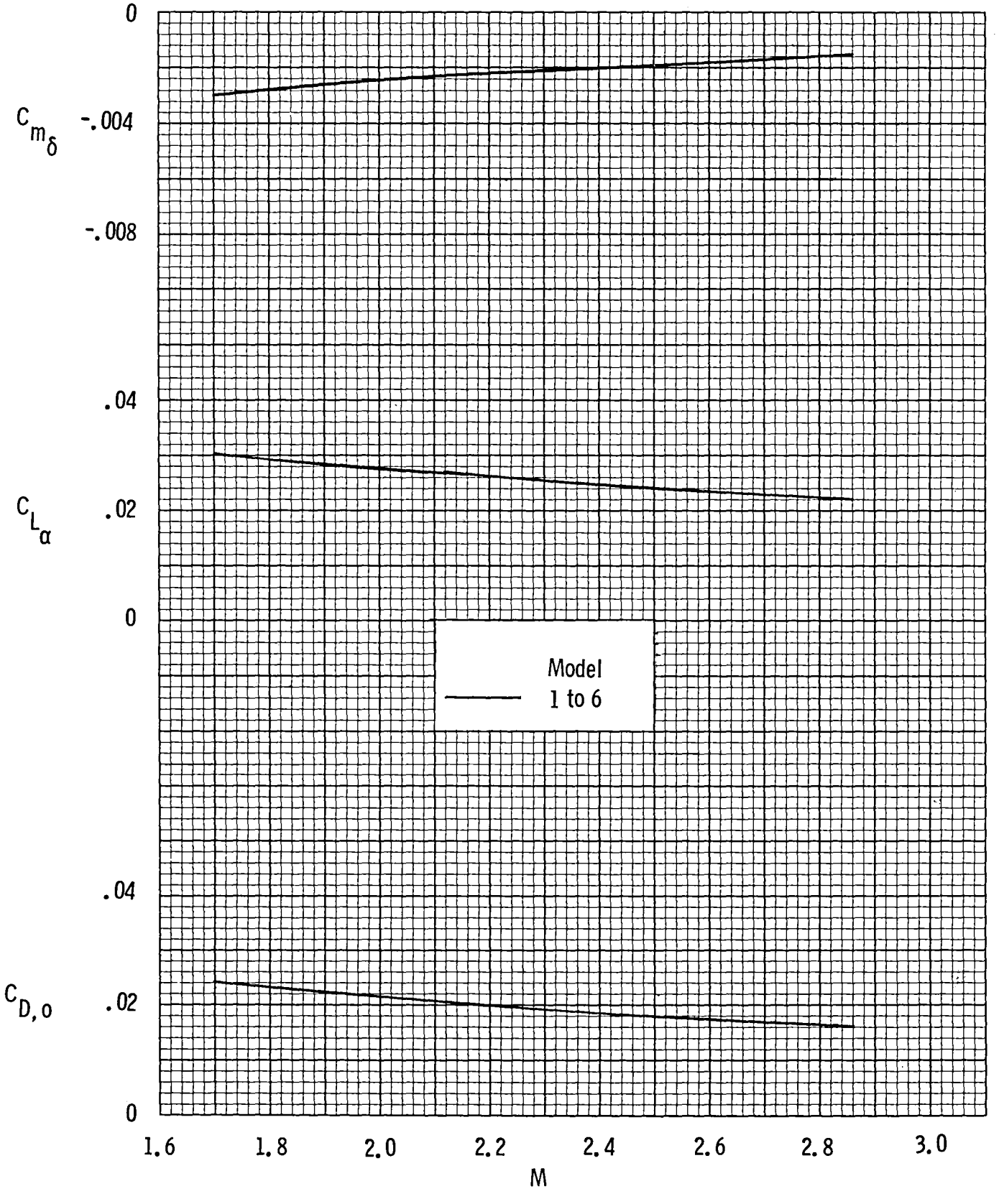
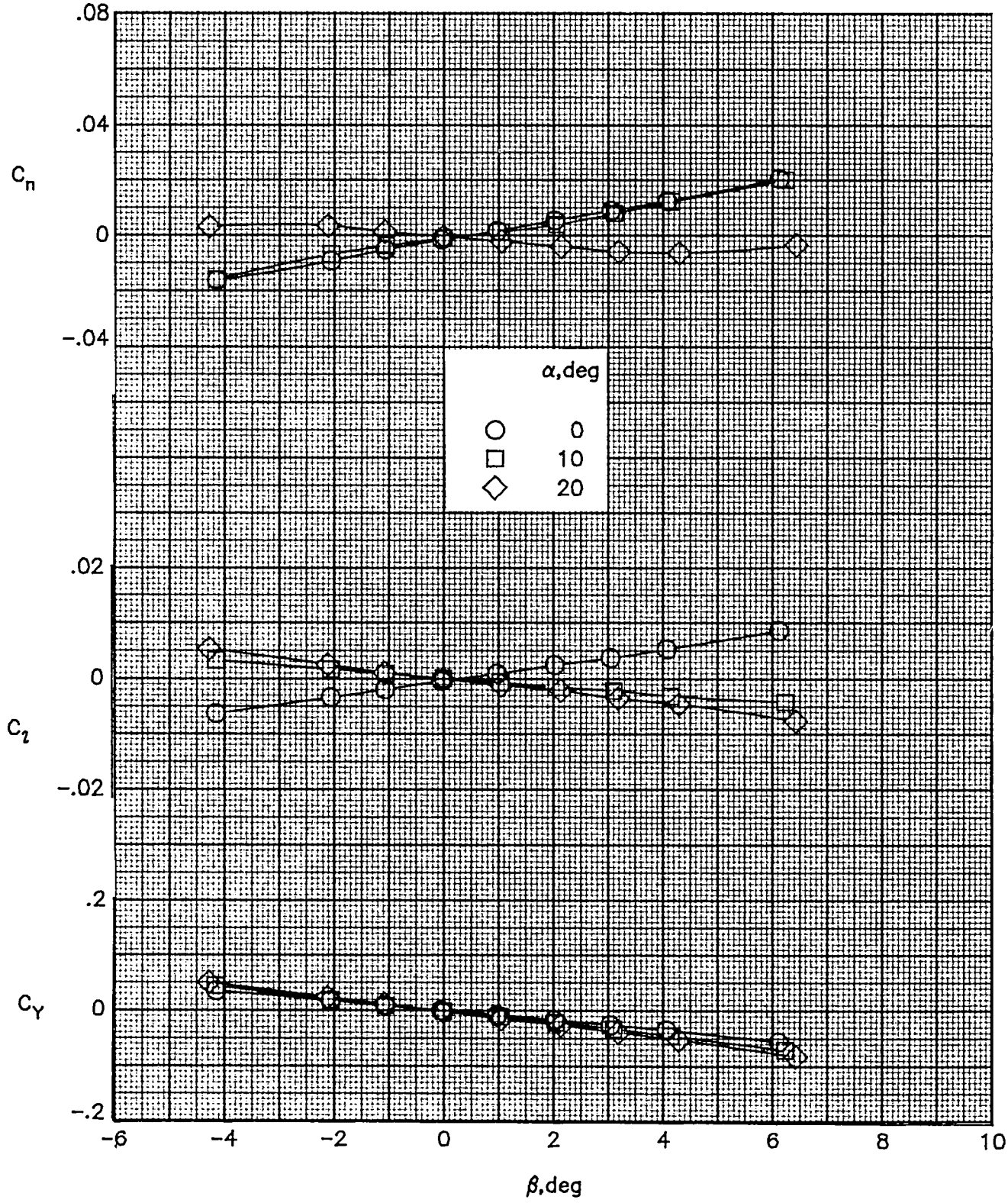
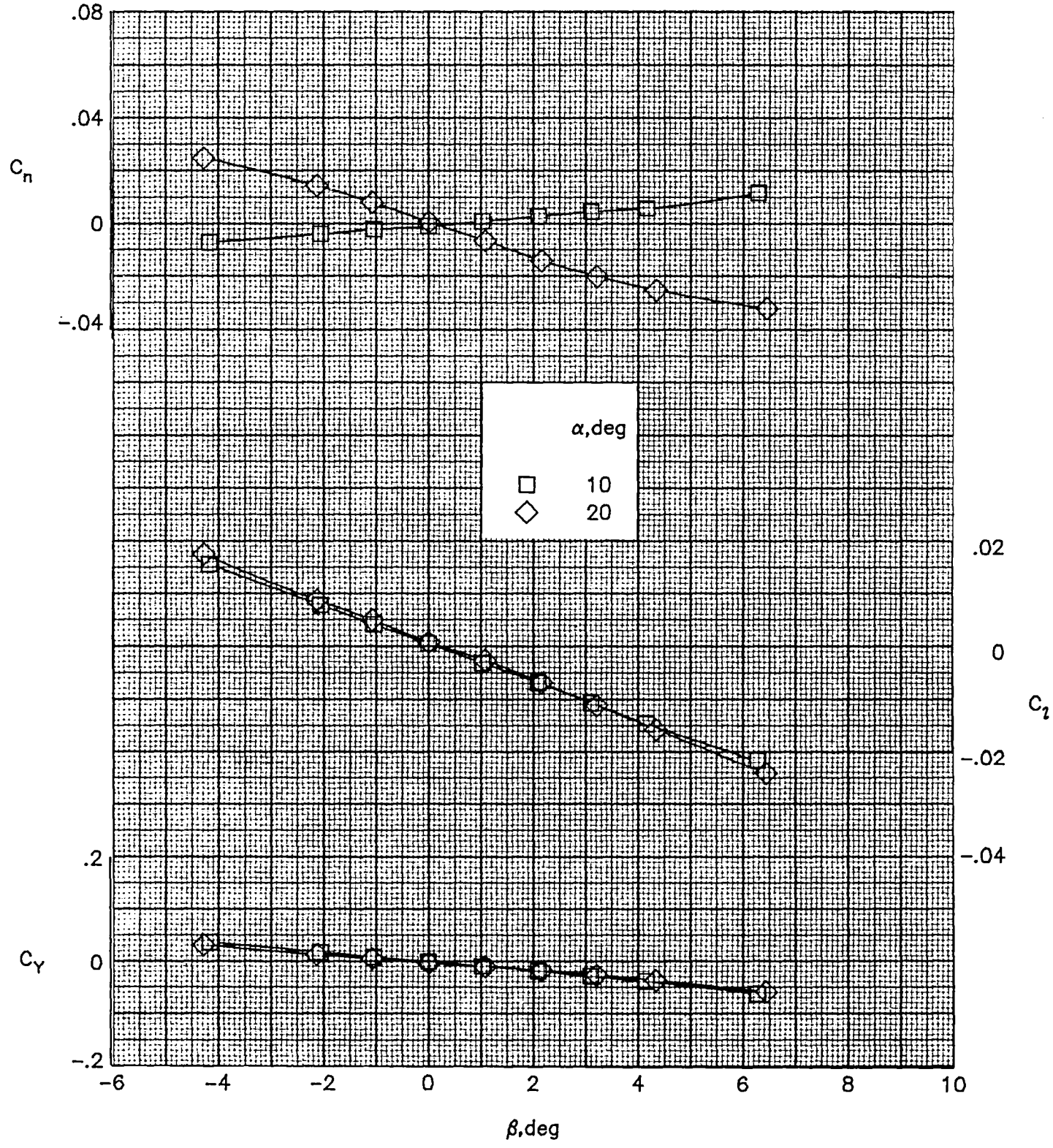


Figure 5.- Summary of longitudinal aerodynamic characteristics at $\alpha \approx 0°$.



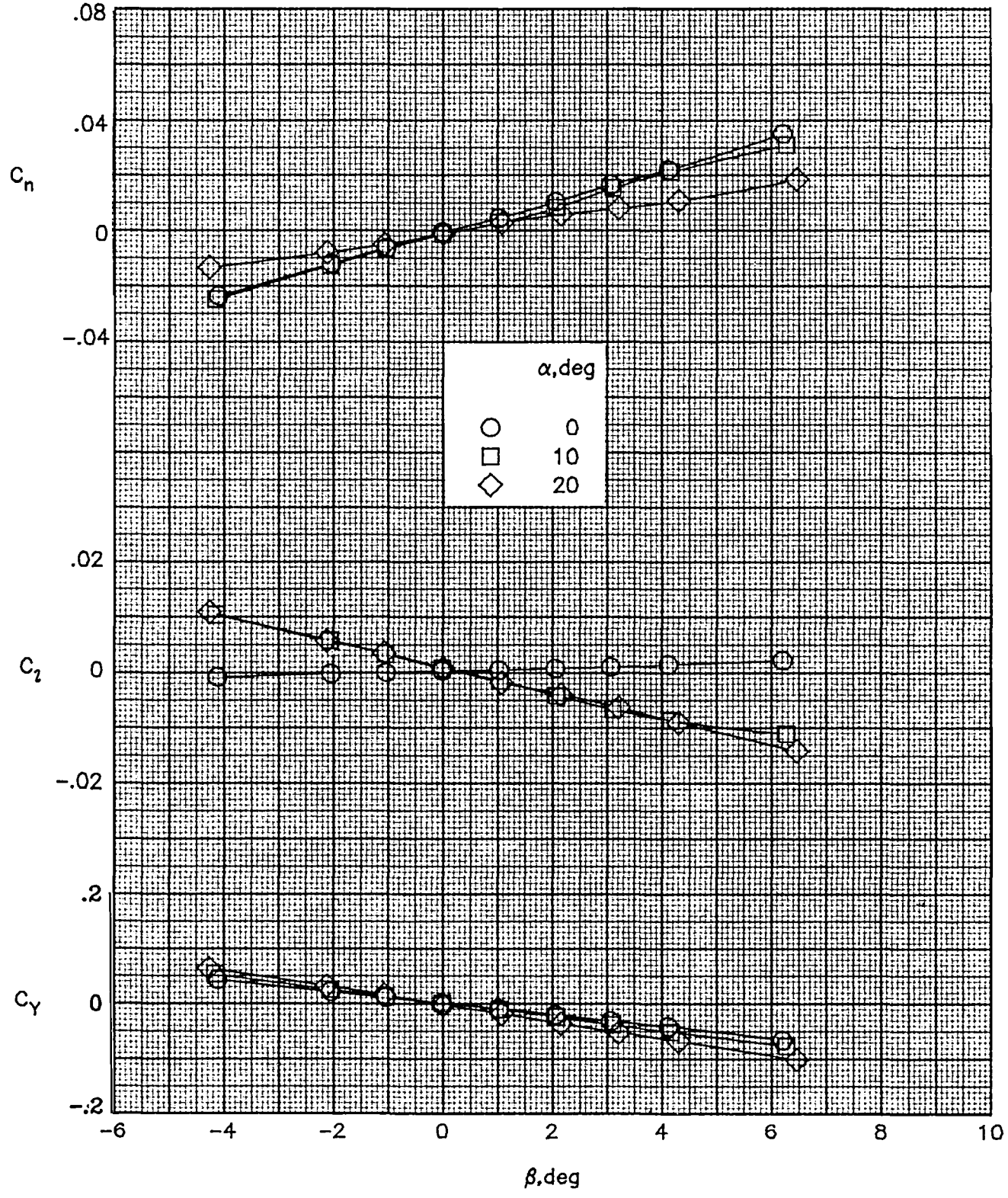
(a) Model 1.

Figure 6.- Lateral aerodynamic characteristics at M = 1.70.



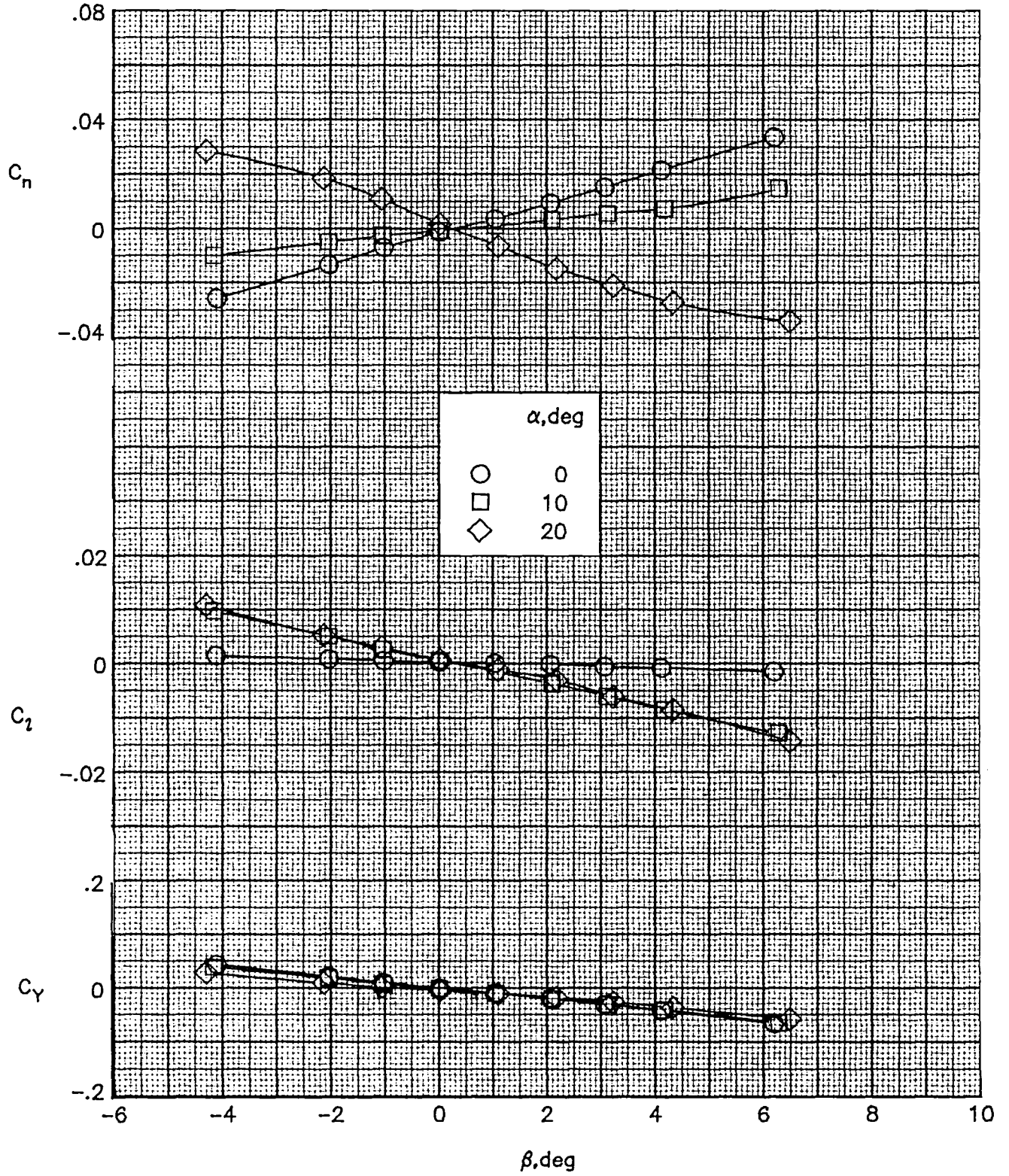
(b) Model 2.

Figure 6.- Continued.



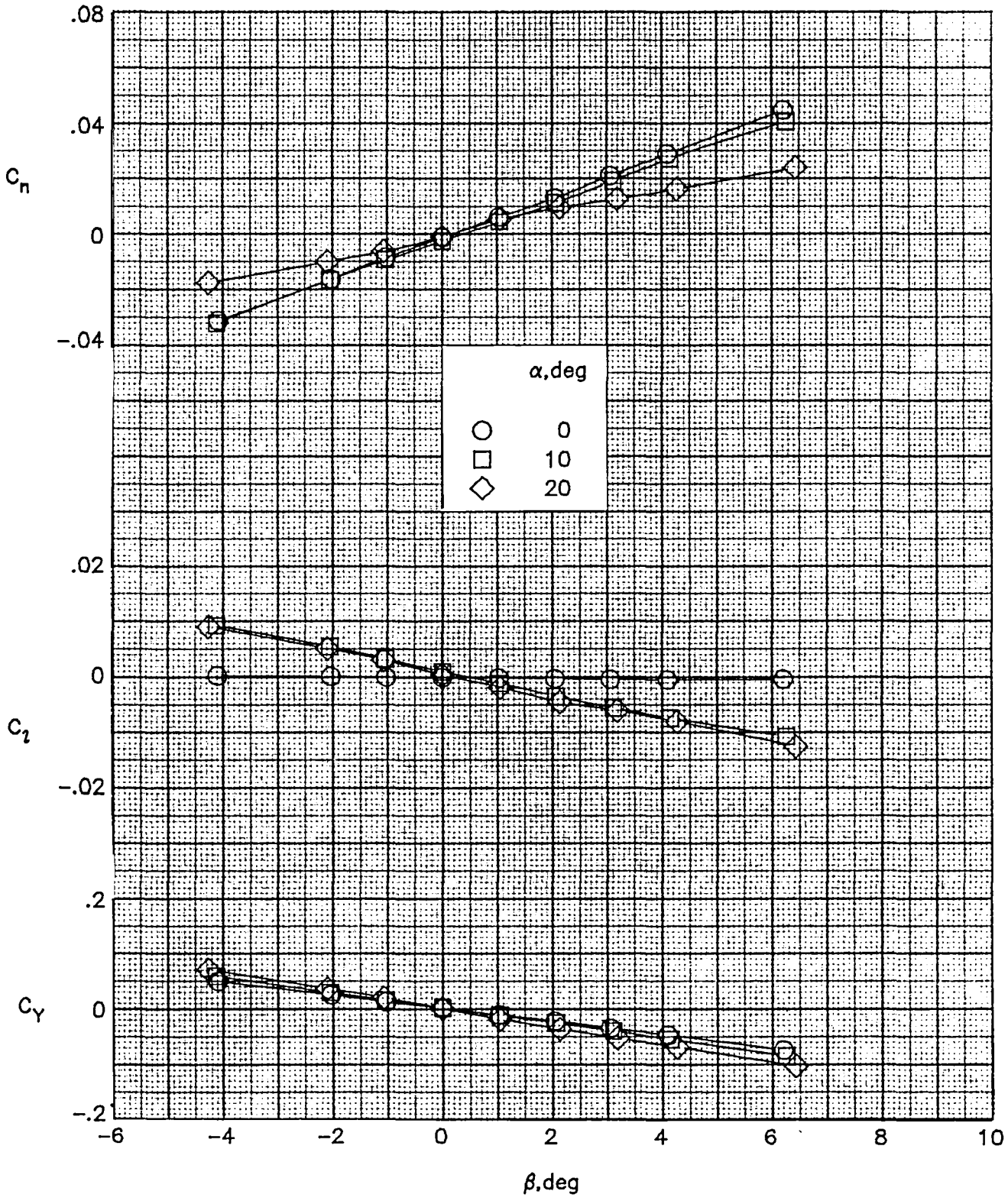
(c) Model 3.

Figure 6.- Continued.



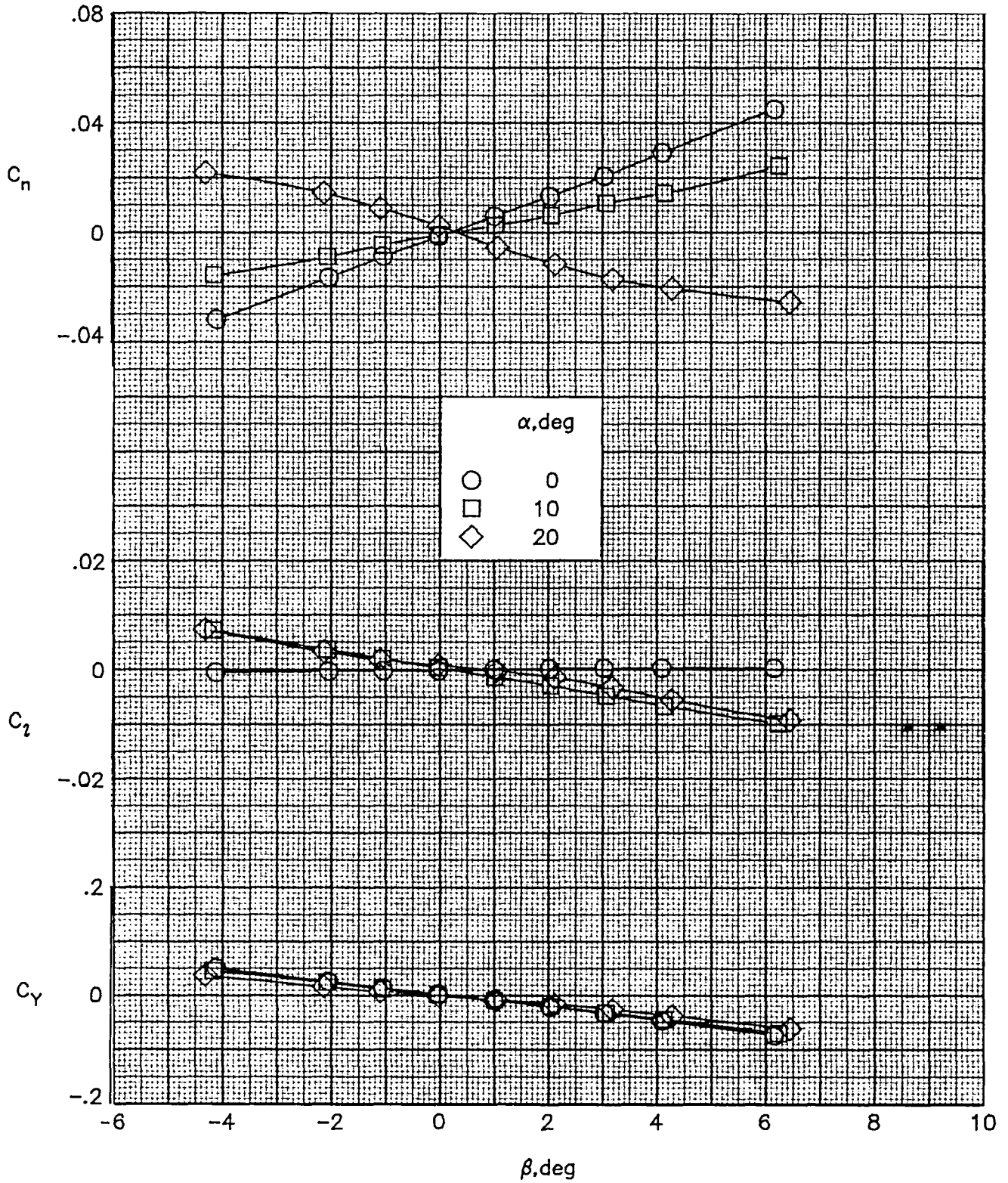
(d) Model 4.

Figure 6.- Continued.



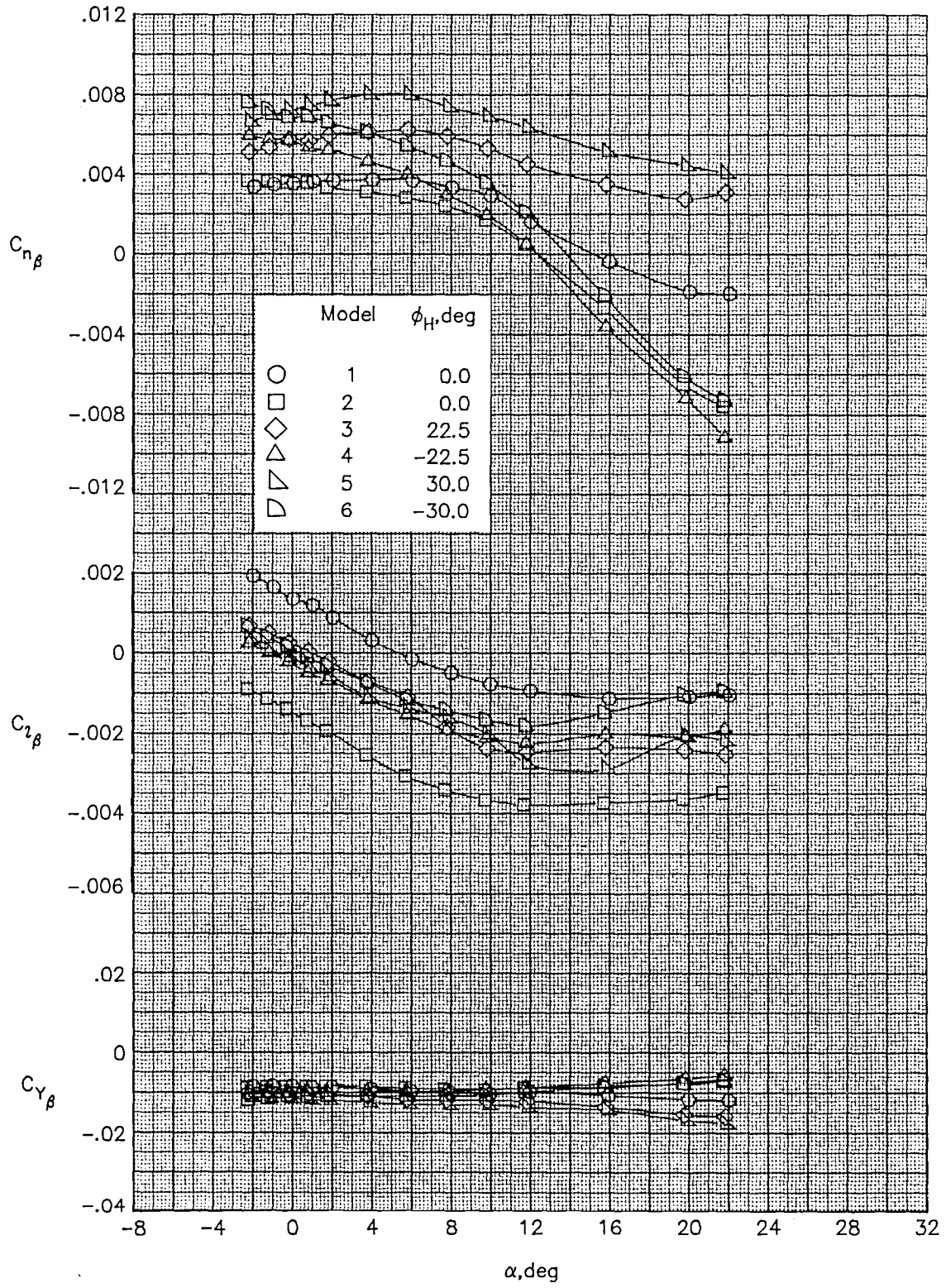
(e) Model 5.

Figure 6.- Continued.



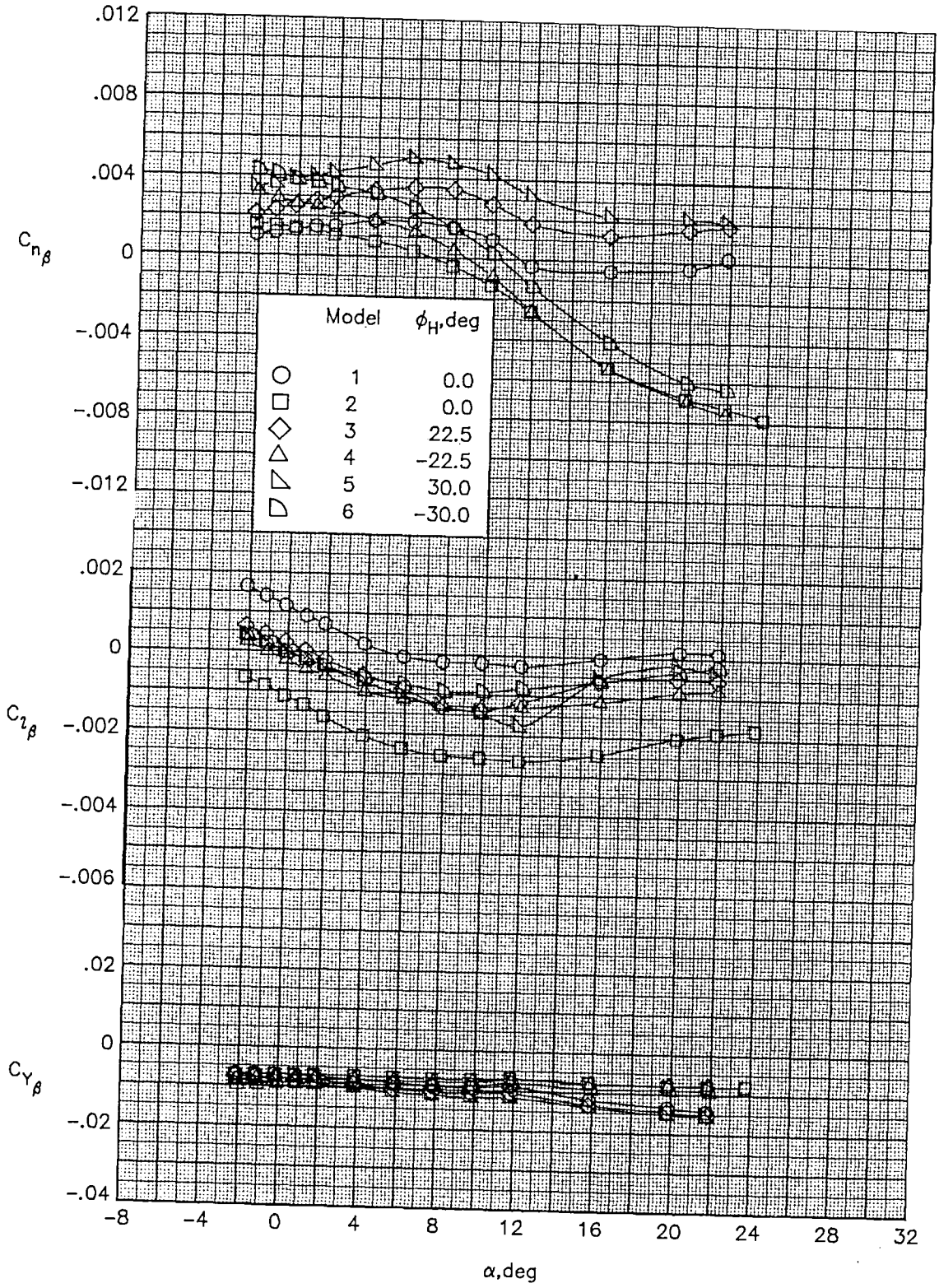
(f) Model 6.

Figure 6.- Concluded.



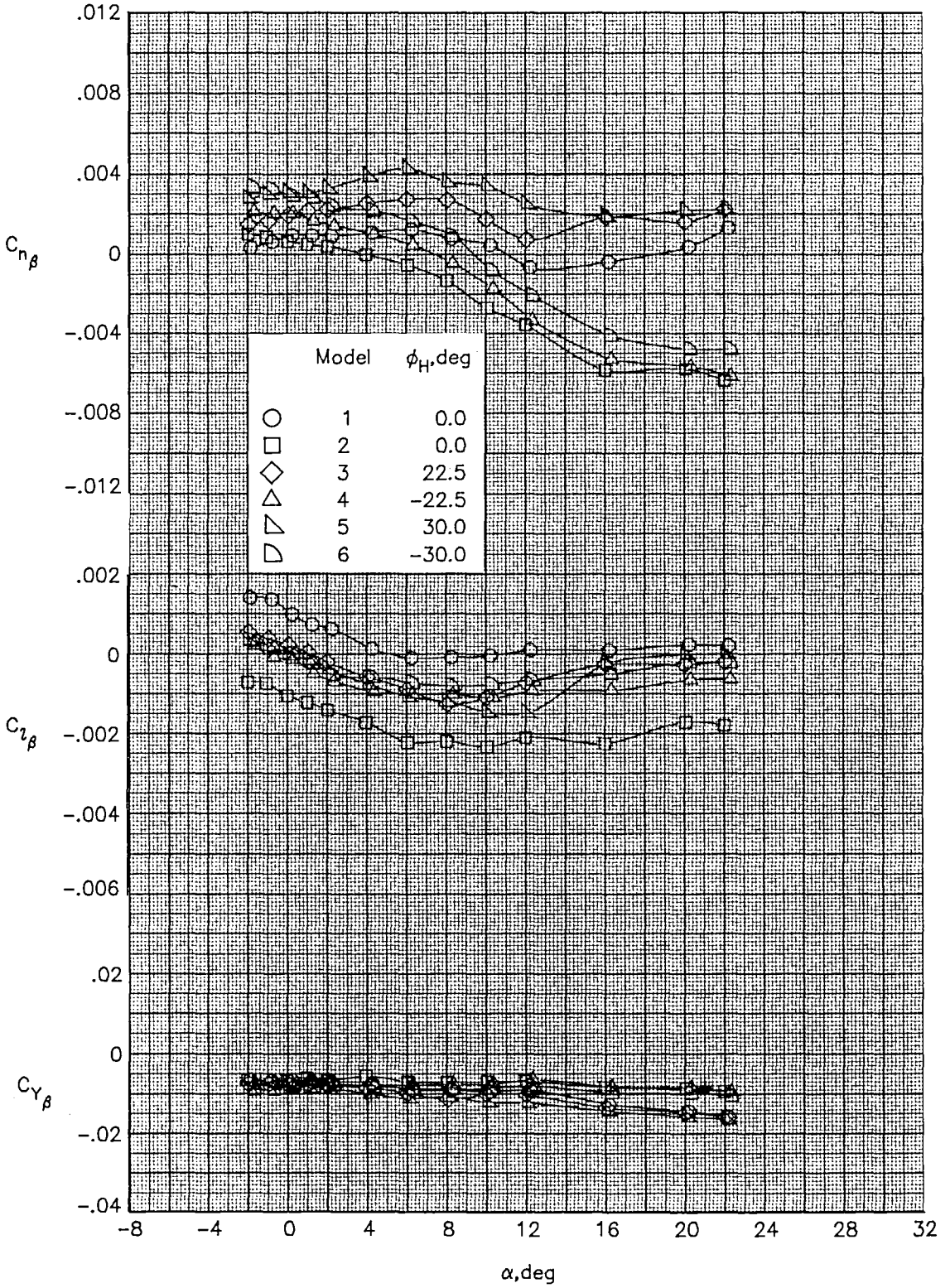
(a) M = 1.70.

Figure 7.- Lateral-directional stability characteristics.



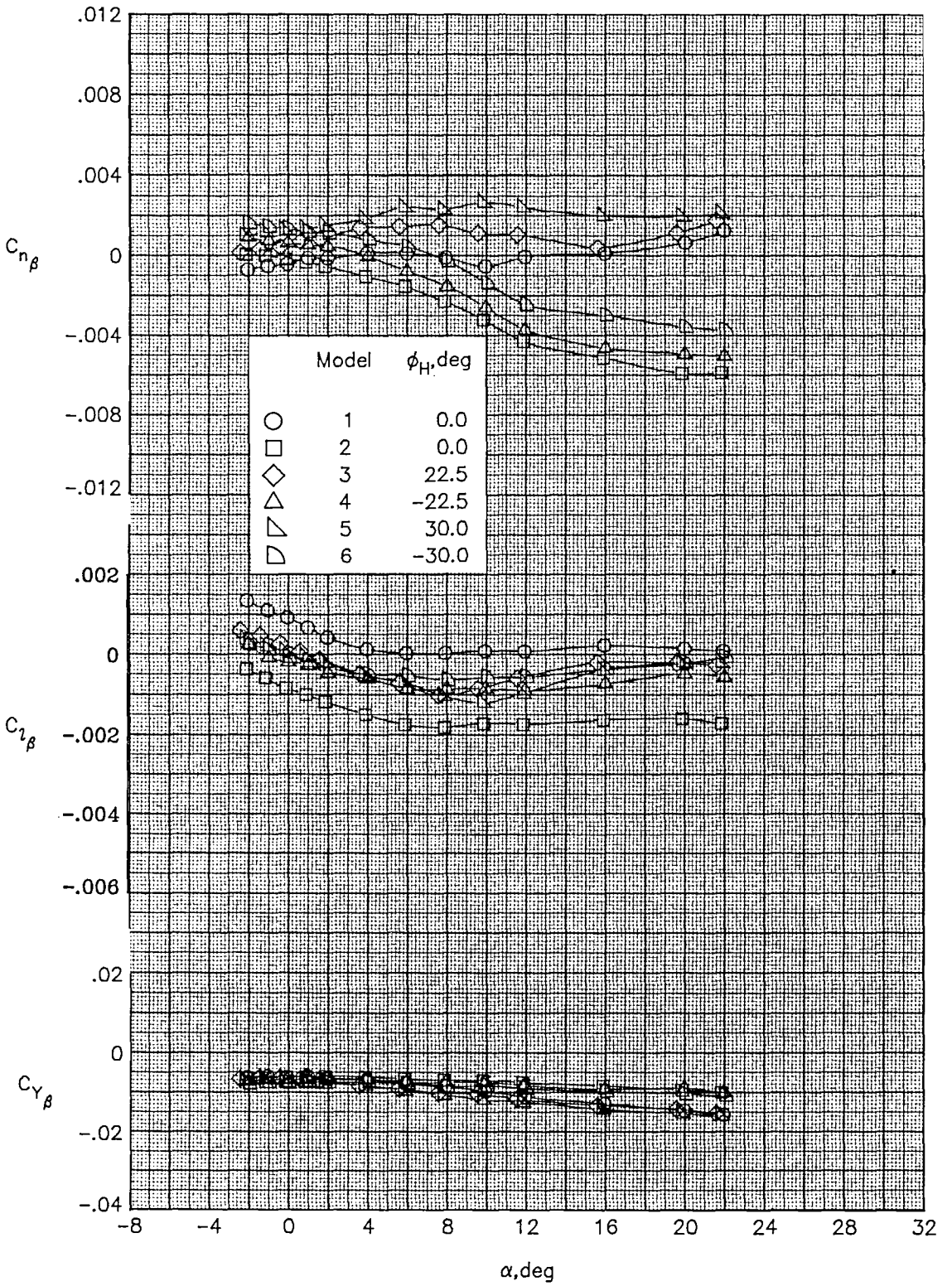
(b) M = 2.16.

Figure 7.- Continued.



(c) M = 2.36.

Figure 7.- Continued.



(d) M = 2.86.

Figure 7.- Concluded.

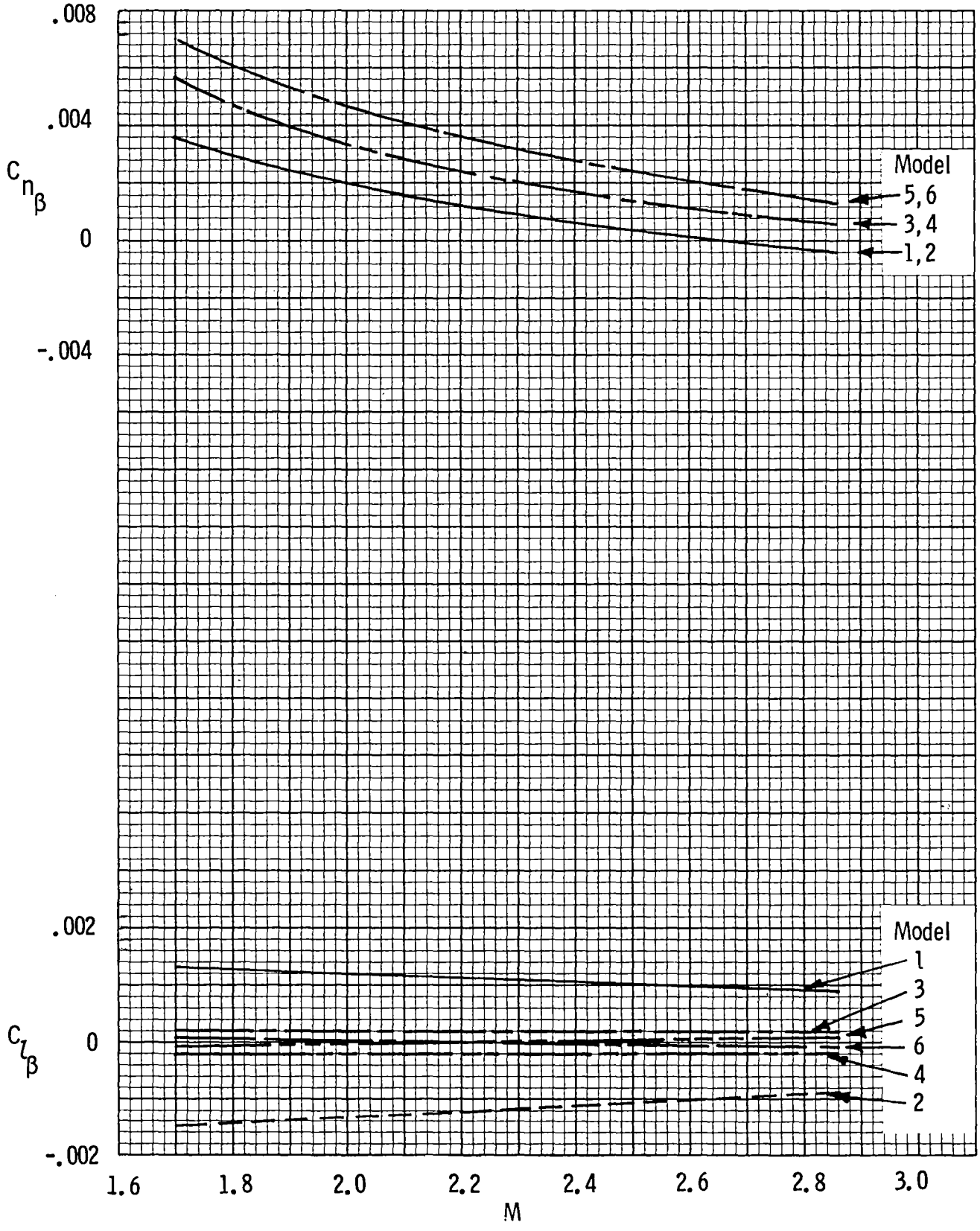


Figure 8.- Summary of lateral-directional stability parameters at $\alpha \approx 0°$.

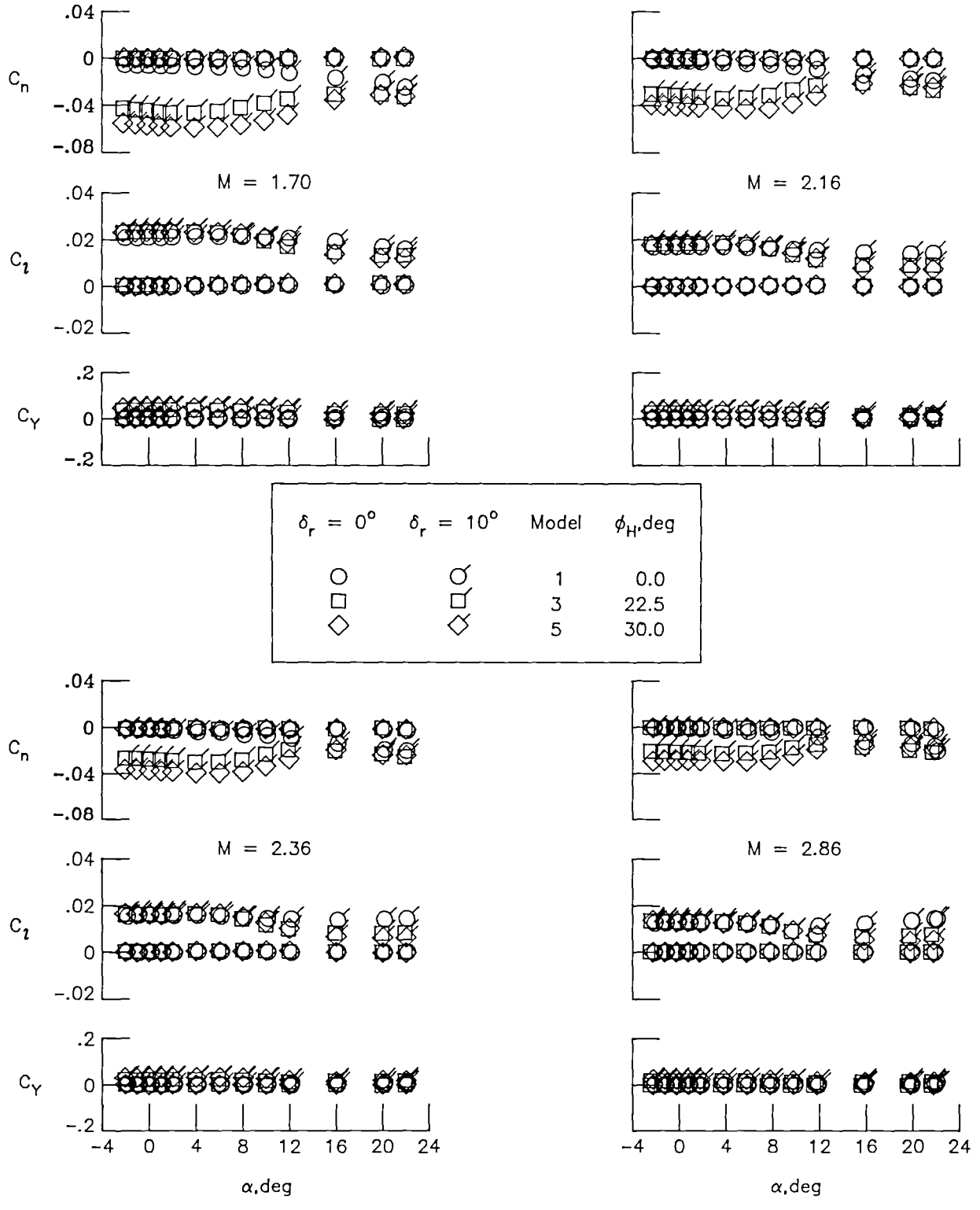


Figure 9.- Roll-control characteristics for models 1, 3, and 5 with two horizontal tail fins deflected.

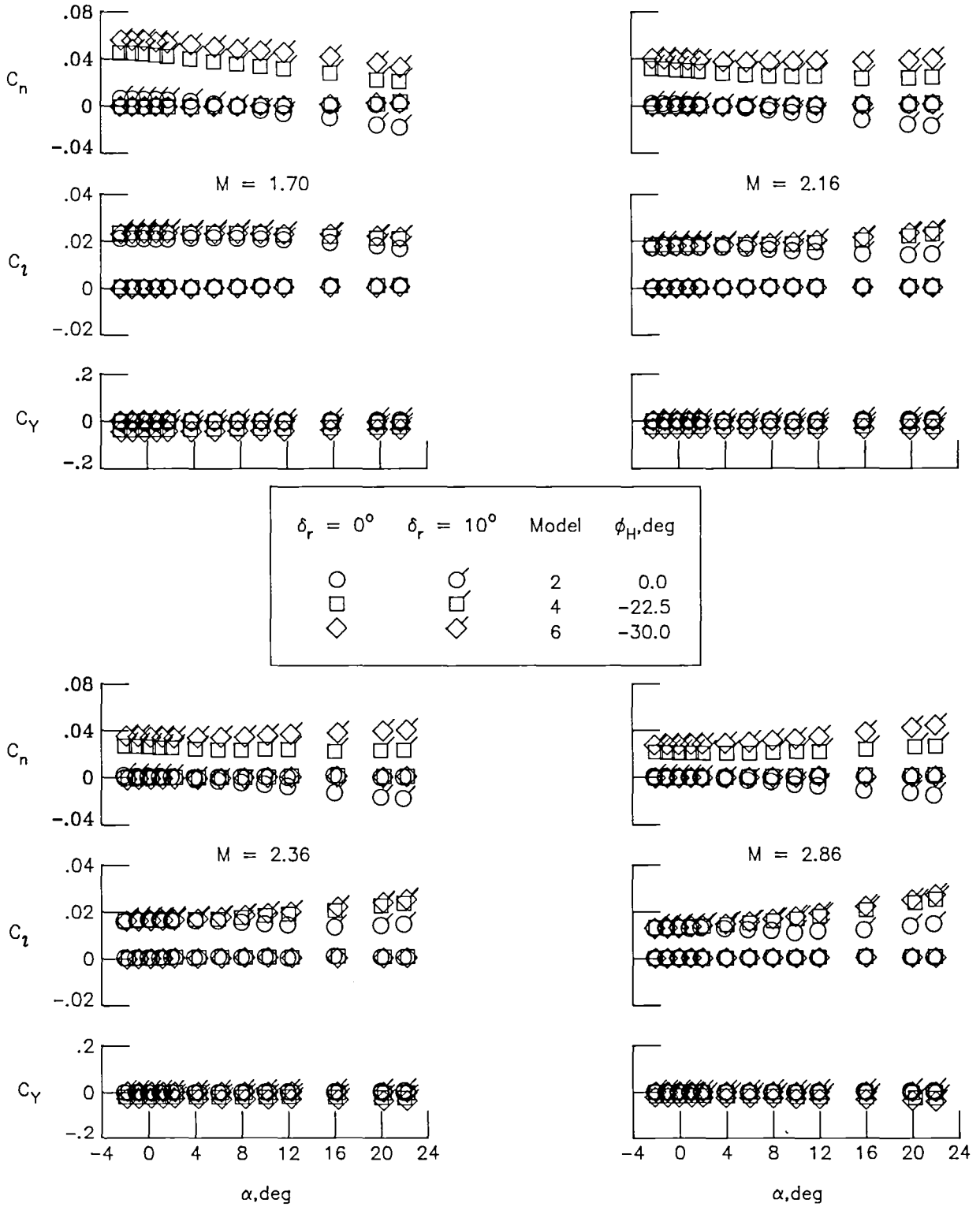


Figure 10.- Roll-control characteristics for models 2, 4, and 6 with two horizontal tail fins deflected.

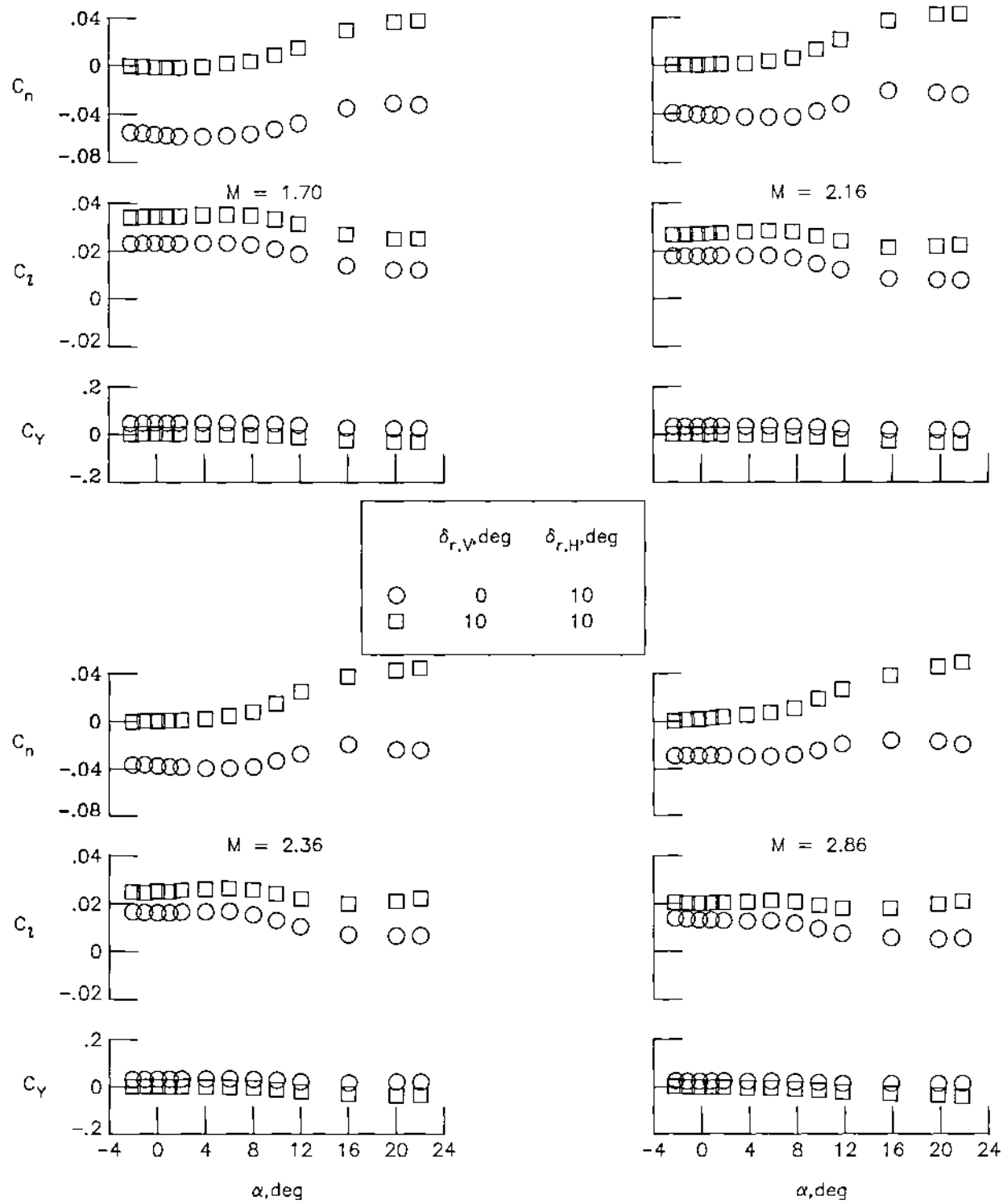


Figure 11.- Roll-control characteristics for model 5 with two or three tail fins deflected.

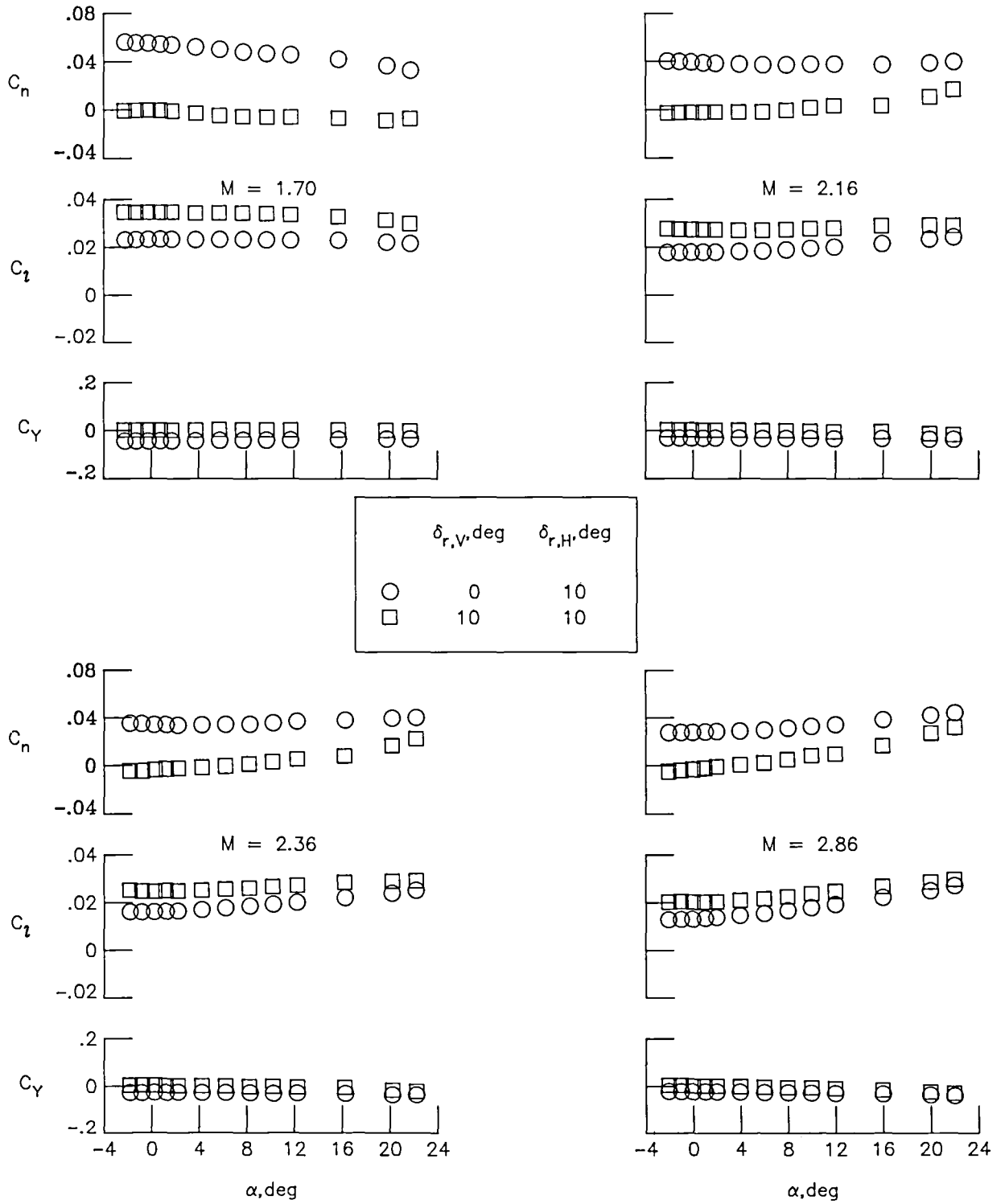


Figure 12.- Roll-control characteristics of model 6 with two or three tail fins deflected.

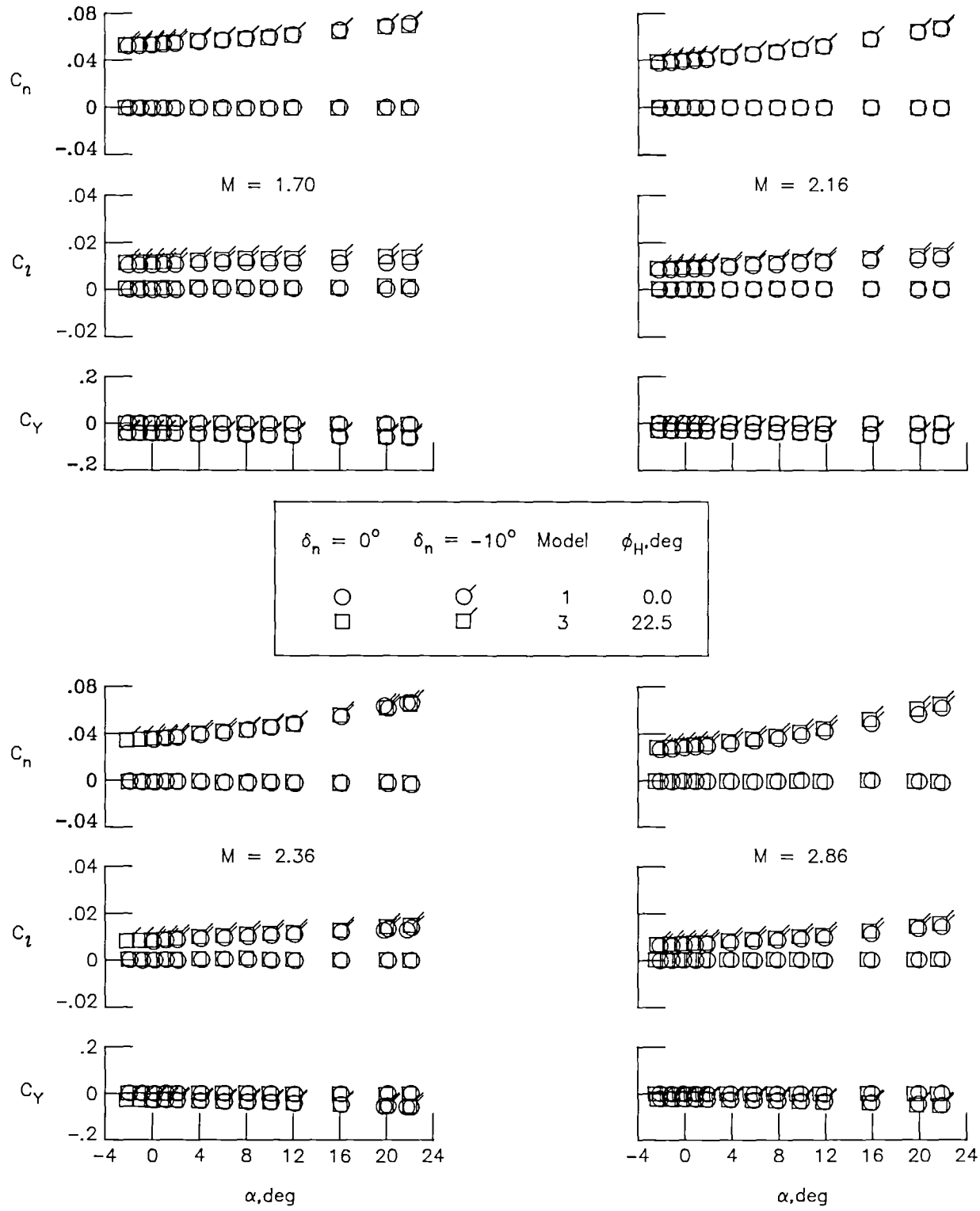


Figure 13.- Yaw-control characteristics for models 1 and 3 with vertical tail fin deflected.

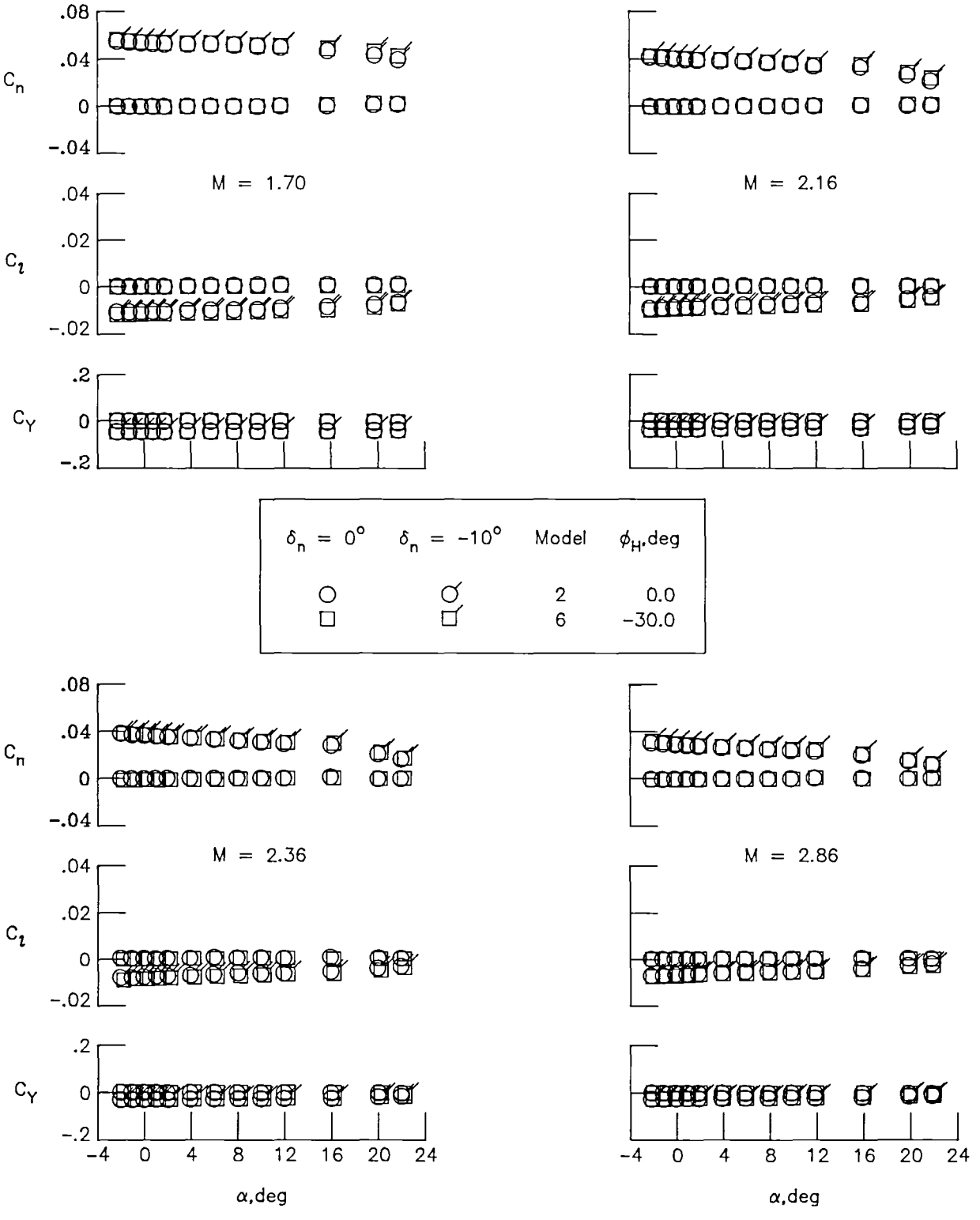


Figure 14.- Yaw-control characteristics for models 2 and 6 with vertical tail fin deflected.

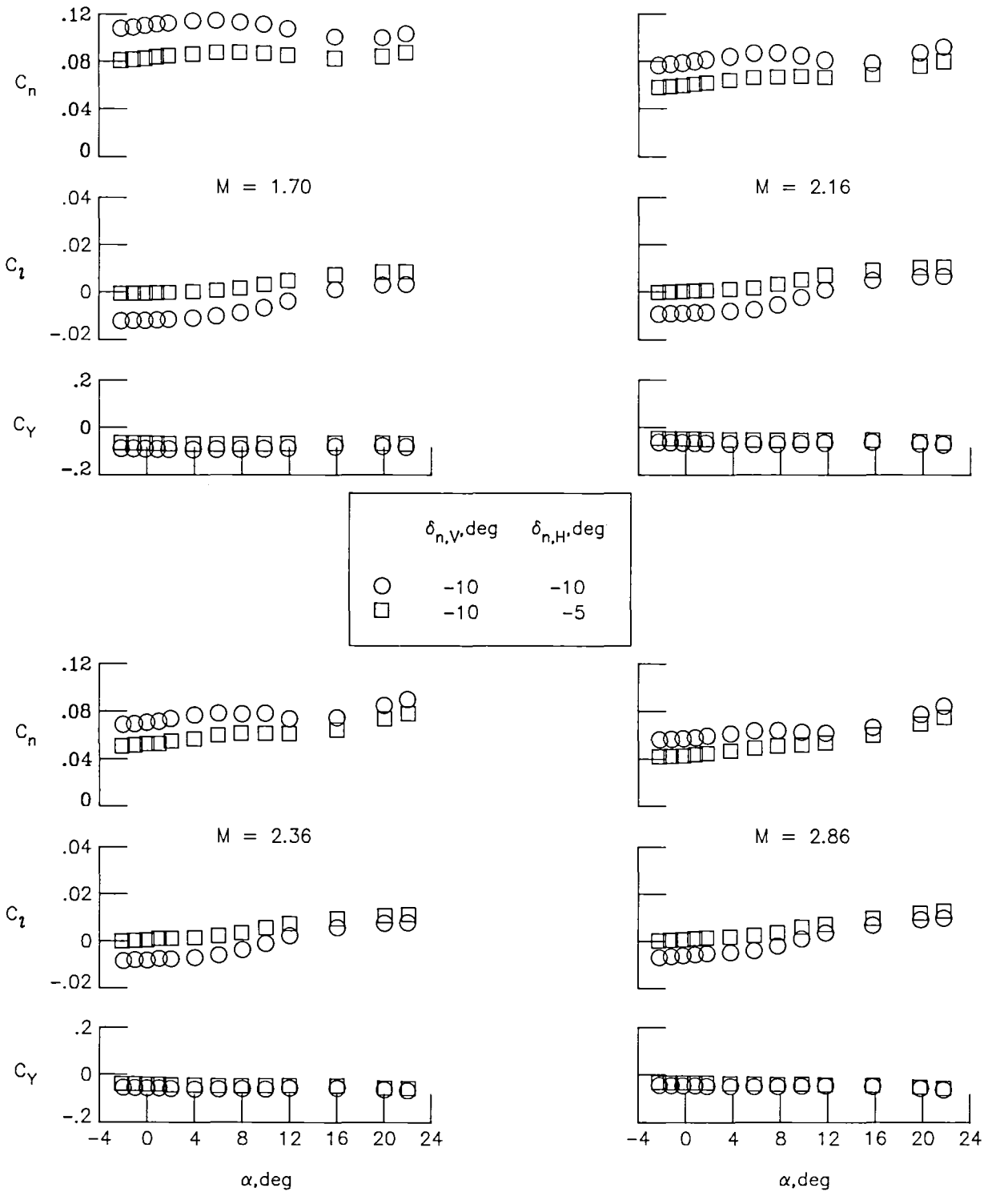


Figure 15.- Yaw-control characteristics for model 5 with three tail fins deflected.

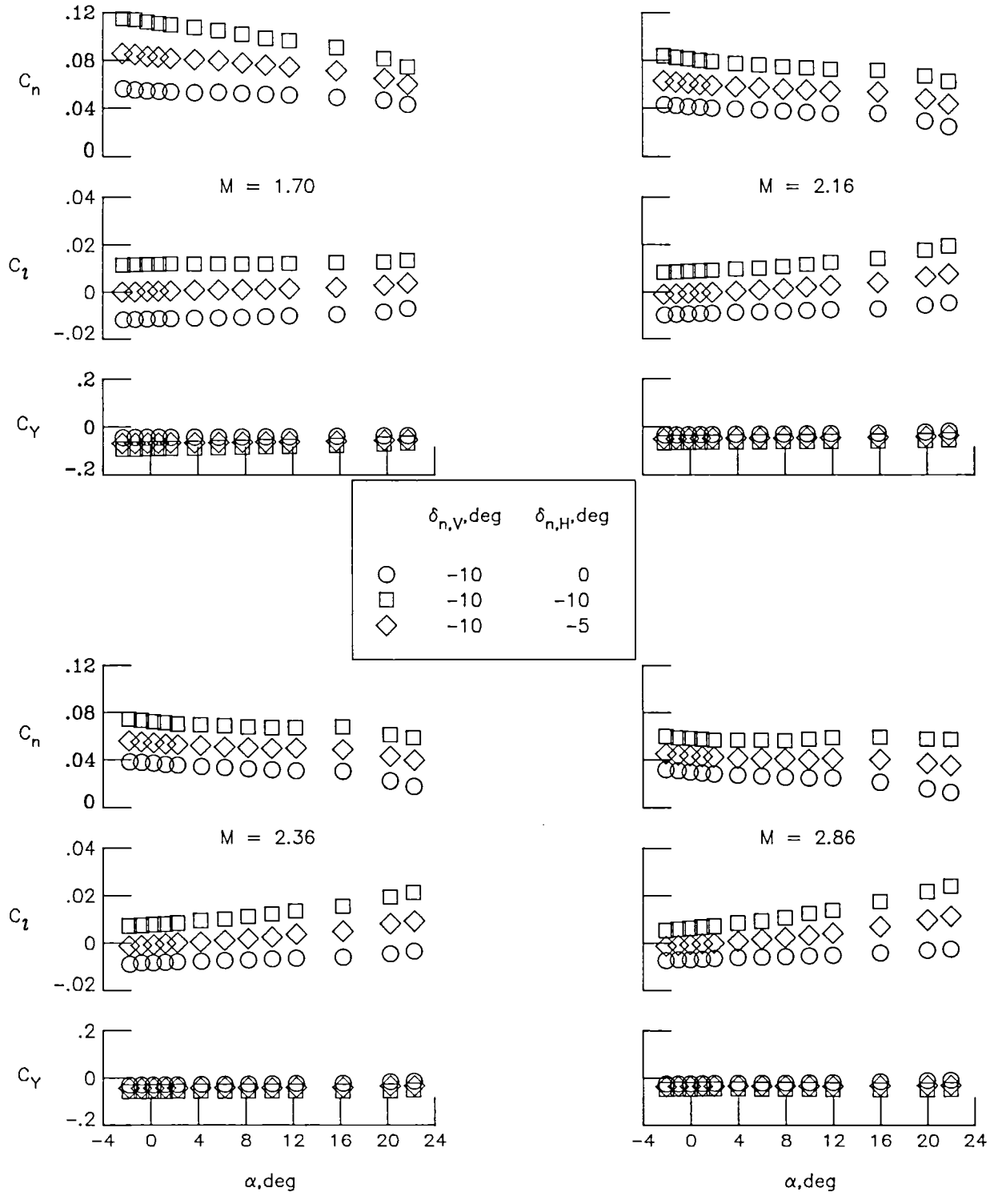
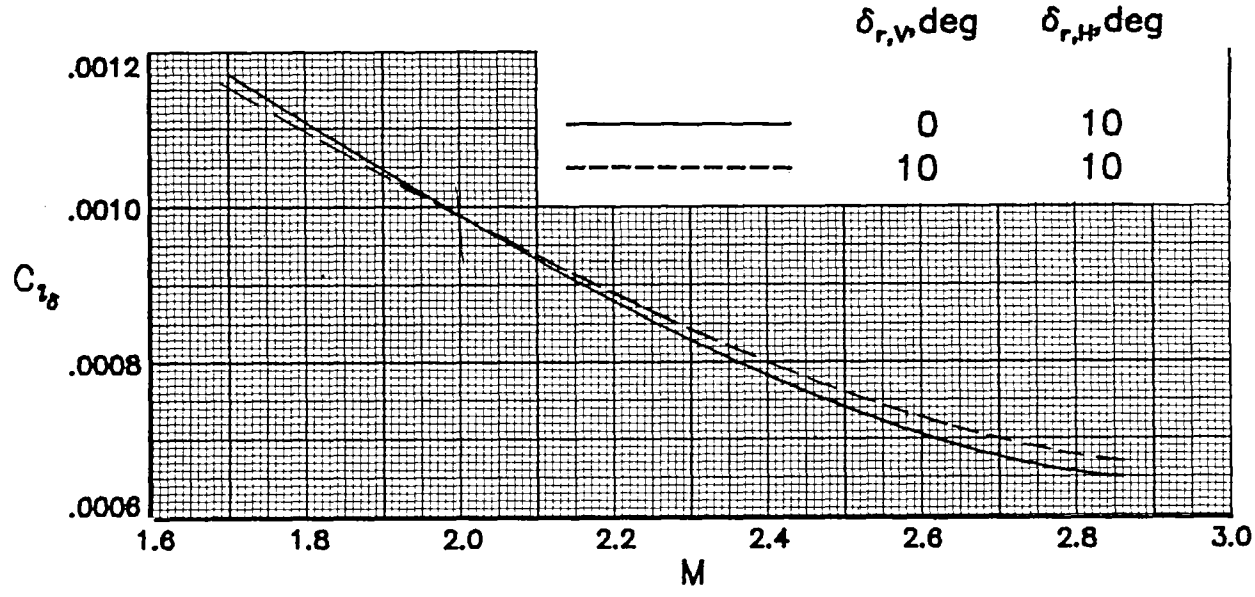
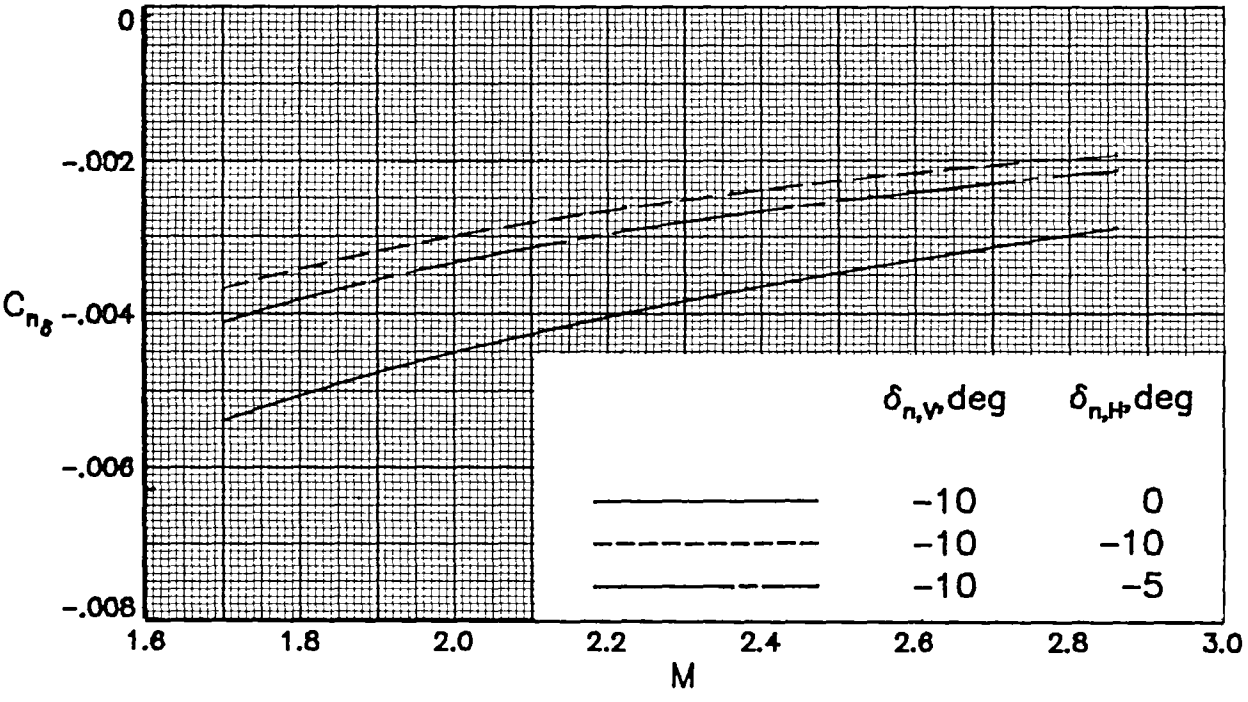


Figure 16.- Yaw-control characteristics for model 6 with one or three tail fins deflected.



(a) Roll control.



(b) Yaw control.

Figure 17.- Roll- and yaw-control effectiveness per degree of total tail-fin deflection for models 5 and 6 at $\alpha \approx 0°$.

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15. Supplementary Notes

16. Abstract

An experimental wind-tunnel investigation has been made on a missile model with either a lower vertical tail fin with a pair of horizontal fins having 0°, 22.5°, or 30° dihedral or an upper vertical tail fin with horizontal fins having 0°, -22.5°, or -30° dihedral. The results indicated that those configurations with horizontal fins at or below the horizontal plane had nearly linear pitching-moment characteristics, while those with the horizontal fins above the horizontal plane experienced pitch-up which increased with increasing horizontal-fin-dihedral angle. At zero angle of attack, the configurations were directionally stable at most test Mach numbers. Generally, those configurations with the upper vertical fin had positive effective dihedral at zero angle of attack, while those with the lower vertical fin had negative effective dihedral. For roll control, three deflected tail fins produced more total roll control than the two horizontal fins. For yaw control, three tail fins deflected equally or differentially produced more total yaw control than the single vertical fin.

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